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Chemical Analysis of Waste Crankcase Oil Combustion Samples

Battelle Columbus Labs., OH

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CHEMICAL ANALYSIS OF WASTE CRANKCASE OIL COMBUSTION SAMPLES

by

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Oils	Fuels	Stationary Sources	11H	21D
Crankcases		Crankcase Oils	21J	
Combustion		Air-atomizing Burner	21B	
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ABSTRACT

This study provides information about emissions from waste crankcase oil heaters. The data provided should be useful to heater manufacturers and to regulators. Burner design and fuel composition both have an obvious effect on the level of inorganic elements emitted. The vaporizing pot burner retained a significant amount of the trace elements to be carried by the flue gas into the stack. The study also showed that total organic emissions from the two burner designs are similar. However, higher levels of polynuclear aromatic hydrocarbons (PAH) were found in discharges of the vaporizing pot burner.

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SECTION 1

INTRODUCTION

Emissions from two waste oil fired space heaters were sampled by the EPA and chemically analyzed by Battelle-Columbus Laboratories using EPA Level 1 procedures (1), together with advanced metals analysis. A vaporizing heater system (Kroll Waste Oil Heater) which operates by vaporizing the oil for combustion was used for one set of studies. The second heater was an air atomizing unit which atomizes oil into the combustion zone (Dravo/ Hastings Thermoflo Waste Oil Heater). The different oil induction systems result in differences in the kind and amount of sample recovered from the units. The vaporizing pot heater produced both flue gas and a pot residue, whereas, the air atomizing heater produced only flue gas. The combustion of both truck and automotive crankcase oils was examined in each heater, resulting in four test runs. During each of these four test runs, the stack was sampled by two different techniques: the Source Assessment Sampling System (SASS) train and a dilution tunnel, thus producing eight sets of sampling data. Specifically, the following analyses were performed:

1. Level 1 analysis of four SASS trains, four sets of dilution filters and two samples of pot residue.

2. Determination of heating value, moisture, ash, viscosity, and C, H, N, S, analysis of the two waste oils.

3. Inductively coupled argon plasma (ICAP) analysis for 28 elements on 20 samples to include:

    4 - combined particulates from SASS trains

    4 - combined 1st impinger and module condensate solutions

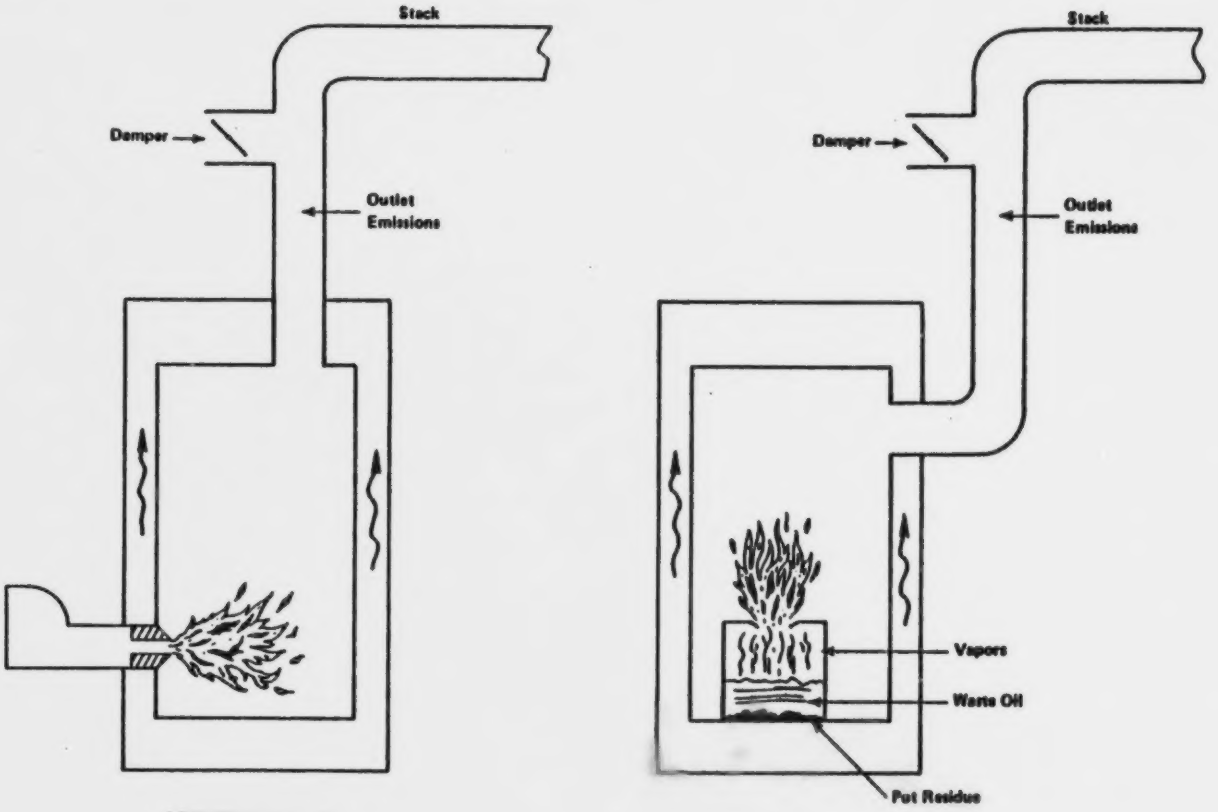
    4 - 2nd and 3rd impinger solutions

    4 - dilution filters

    2 - pot residues

    2 - waste crankcase oils

The two burners tested are illustrated in Figure 1.


Stack
Damper
Outlet Emissions
Stack
Damper
Outlet Emissions
Vapors
Waste Oil
Pot Residue

LOW PRESSURE AIR ATOMIZATION BURNER

VAPORIZING POT BURNER

FIGURE 1. LOW PRESSURE ATOMIZING AND VAPORIZING POT COMBUSTION PRINCIPLES.

SECTION 2

CONCLUSIONS

Three basic comparisons were performed in this study: burner type, fuel, and method of sample collection. Two types of space heaters were studied; low pressure air atomization and vaporizing pot. Both heaters are designed to operate on waste engine oil. Two fuel types were compared in this study; one fuel obtained from an automotive, waste oil supplier, and a second fuel which primarily contained engine oil used for truck lubrication.

The sampling comparison was made between two methods used to collect gaseous emissions. One technique, the Source Assessment Sampling System (SASS), provides information about the size distribution of particulate discharges in burner outlet gas streams. The SASS sampler is also efficient for collecting gaseous discharges, principally organic material, which is collected by sorption on a resin bed. The second sample collection system, a dilution tunnel, employs a clean air dilution stream followed by filtration. By diluting the hot discharge gases before a sample is collected, the dilution tunnel theoretically simulates the natural dilution and chemical transformation that occurs when stack gases are discharged to the atmosphere.

The dilution tunnel method is designed to collect particulate matter, including organic materials. The large gas volumes involved in the dilution tunnel prohibit collecting vapors. In this system, the gas sample is introduced into a cylindrical dilution chamber in which the gas is mixed with filtered dilution air which has been passed through a laminar flow element. The resulting mixture is trapped by filtration at the end of the dilution tunnel where a 20 inch square Teflon-coated fiberglass filter collects the sample. Dilution ratios of 10:1 were used. Laboratory experiments have shown that thorough mixing occurs, and that condensation aerosols are formed in the dilution chamber.

The obvious difference between burner types is the residue produced by the vaporizing pot burner. The air atomizing burner yielded higher gas-phase concentrations of most inorganic species than the vaporizing pot combustion system. In both combustion systems, the time-weighted-average threshold limit values (TLVs) were exceeded for several elemental species. The vaporizing pot burner produced lower trace specie air emissions, because a significant amount was retained in the pot residue.

TYPING GUIDE SHEET

No firm health risk conclusions can be drawn directly from the results of this project. Stack concentrations were sampled, not ground level ambient concentrations. Although the dilution tunnel theoretically simulates natural dispersion and dilution, it is not certain at this time whether the tunnel accurately simulates air circulation in and around a service station or garage workplace, where these heaters are commonly used.

Two fuel types were compared in this study: one was an automotive crankcase waste oil obtained from a service station, and the second fuel was a truck crankcase waste oil that came from a diesel truck fleet. Fuel comparisons revealed generally higher concentrations of metallic species in the automotive oil. Total organic concentrations were relatively similar for the two fuels although chemical composition of the organic discharges were different.

It was apparent in these tests that the dilution tunnel did not efficiently collect the gaseous discharges measured. A dilution tunnel is expected to lose volatile and semivolatile organic species.

Specific correlations derived from the study given in the following summary.

AIR ATOMIZING VERSUS VAPORIZING POT HEATERS

- Polynuclear Aromatic Hydrocarbons (PAH) were identified in emissions from the vaporizing pot burner. The highest levels of PAH were found in pot residues when automotive crankcase oil was used as the fuel; however, PAH were also found in the gaseous emissions from vaporizing pot tests using truck waste oil.

- Total organics emitted from these heaters were similar in quantity and type. However, the vaporizing pot heater showed significant quantities of organic material in the pot residue, indicating that the air atomizing heater produces less overall organic material than the vaporizing pot and is therefore burning more efficiently.

- The vaporizing pot heater, which burns heated oil vapor, produces a pot residue. The air atomizing heater which atomizes the fuel before combustion, does not produce a pot residue but does produce a coating of particulate on the surface of the combustion chamber and heat transfer surfaces. It was observed that the air atomizing heater releases much higher concentrations of metals into the air than does the vaporizing pot. This trend is not followed by the organics as mentioned above.

- Mass balances of elements present in the fuel and the effluents were better for the vaporizing pot than for the air atomizing heaters.

SASS TRAIN VERSUS DILUTION TUNNEL SAMPLING

- The SASS train collected more organic material than the dilution tunnel. Three of the four tests showed 20-30% lower organic concentration when sampled by dilution tunnel.
- The SASS train was found to collect a higher percentage of the metals present in the fuel than the dilution tunnels.

TRUCK VERSUS AUTOMOTIVE CRANKCASE OILS

- Ultimate analysis of the two fuels indicated a higher oxygen content in the automotive crankcase oils. What effects, if any, this had on combustion or combustion products is unknown.
- The automotive waste crankcase oil contained a higher concentration of metals than did the truck crankcase oil. This was reflected in the effluents.

SECTION 3

EXPERIMENTAL

A modified Level 1 (1) analysis of four crankcase oil effluents was performed. The specific methods and approach are described below.

SAMPLING

EPA personnel at Research Triangle Park sampled effluents from two space heaters burning waste crankcase oils. The vaporizing pot unit was initially fired with 250 ml of #2 fuel oil to bring the temperature to a sufficient level for the vaporization of the waste oils tested. Then sufficient waste oil was combusted to operate the unit for the approximately five hour sampling run. A portion of the waste oil not vaporized remained as a residue in the vaporizing pot, and it too was analyzed. The second heater utilized an air atomizing burner. This unit did not produce sufficient residues to be analyzed although a light deposit was found in the combustion chamber and heat exchanger.

Two sampling runs were performed on each heater, one burning waste crankcase oil from automotive engines, and one burning waste crankcase oil from truck engines, for a total of four sampling runs. The two fuels were waste crankcase oils recovered from the crankcase of trucks burning diesel fuel, herein referred to as "truck", and from motor vehicles burning gasoline, herein referred to as "automotive". No distinction other than fuel burned by the vehicle was made when waste crankcase oils were collected. Each effluent was sampled using a Source Assessment Sampling System (SASS) train and a dilution tunnel. Samples received by Battelle, their identification number, and analyses performed are summarized in Tables 1 through 4.

FUEL ANALYSIS

Phoenix Laboratories (Chicago, Illinois) performed the analyses on both the truck and automotive crankcase oils. These analyses included heat value, density, moisture, ash, and elemental analysis for C, H, N, and S. ICAP (inductively coupled argon plasma) analysis was done on each fuel to determine 28 elements, as well as AAS (atomic absorption spectrometry) for mercury, arsenic, and antimony determinations.

ORGANIC ANALYSIS

Samples were received and extracted with methylene chloride for 24 hours in preparation for organic analysis. Samples extracted included SASS particulate filters, probe rinse, XAD-2 sorbent, module condensate and filter

TABLE 1. LIST OF SAMPLES RECEIVED AND BREAKDOWN OF ANALYSES FROM THE VAPORIZING POT BURNER. FUEL: TRUCK CRANKCASE OIL (RUN E050781)

Sample Description	ID Number	Extraction	TCO GRAV IR	AAS (Hg)	AAS (Sb/As)	SSMS	LC-IR-LRMS*	ICAP
Condensate & 1st impinger	KEA-BCL-CD-O/HI	X	X	X		X		X
2nd & 3rd impingers	KEA-BCL-AI			X	X			X
XAD-2 & module rinse	KEA-BCL-MR/XR	X	X	X		X	X	
Particulate filter	KEA-BCL-PFa	X	X	X		X		X
3 μm & 10 μm cyclone catch	KEA-BCL-3C/10C					X		
Dilution filters #13 & 14	KEA-BCL-DF13/14	X	X	X		X	X	X
Probe rinse	KEA-BCL-PR							
Bottom ash	KEA-BCL-BA	X	X	X		X		X
Fuel feed	KEA-BCL-FFD			X	X			X
		Ultimate and proximate analysis performed by Phoenix Chemical Laboratories.						
Blanks #								
1st impinger blank	KEA-BCL-HIB			X		X		
2nd & 3rd impinger blanks	KEA-BCL-AI-1B			X	X			
XAD-2 & CH_2Cl_2 blank	KEA-BCL-XRB/MCB	X	X	X		X		
Particulate filter blank	KEA-BCL-PFB	X	X	X		X		
Dilution filter blank	KEA-BCL-DFB	X	X	X		X		
CH_2Cl_2/methanol blank	KEA-BCL-MMB		X					

* Only performed if minimum of 15 mg sample available.
# Blanks were same for all four tests.

TABLE 2. LIST OF SAMPLES RECEIVED AND A BREAKDOWN OF ANALYSES FROM THE VAPORIZING POT BURNER. FUEL: AUTOMOTIVE CRANKCASE OIL (RUN E052081)

Sample Description	ID Number	Extraction	TCO GRAV IR	AAS (Hg)	AAS (Sb/As)	SSMS	LC-IR-LRMS*	ICAP
Condensate & 1st impinger	KEA-BCL-CD-O/HI	X	X	X		X		X
2nd & 3rd impingers	KEA-BCL-AI			X	X			X
XAD-2 & module rinse	KEA-BCL-XR/MR	X	X	X		X	X	
Partciualte filters #5 &6	KEA-BCL-PFa5/6	X	X	X		X		X
Dilution filters #16 & 17	KEA-BCL-DF16/17	X	X	X		X	X	X
Probe rinse	KEA-BCL-PR							
Bottom ash	KEA-BCL-BA	X	X	X		X	X	X
Fuel feed	KEA-BCL-FFA			X	X			X

Ultimate and proximate analysis performed by Phoenix Chemical Laboratories.

* Only performed if minimum of 15 mg sample available.

TABLE 3. LIST OF SAMPLES RECEIVED AND A BREAKDOWN OF ANALYSES FROM THE AIR ATOMIZING BURNER. FUEL: AUTOMOTIVE CRANKCASE OIL. (RUN E061881)

Sample Description	ID Number	Extraction	TCO GRAV IR	AAS (Hg)	AAS (Sb/As)	SSMS	LC-IR-LRMS*	ICAP
Condensate & 1st impinger	DREA-BCL-CD-O/HI	X	X	X		X		X
2nd & 3rd impingers	DREA-BCL-AI			X	X			X
XAD-2 & module rinse	DREA-BCL-MR/XR	X	X	X		X		
Particulate filters #7-17	DREA-BCL-PFa7/17	X	X	X		X		X
Dilution filters #18-29	DREA-BCL-DF18/29	X	X	X		X	X	X
Probe rinse	DREA-BCL-PR							
Cyclone catch	DREA-BCL-1C/3C/10C	X	X	X				X
Nitric acid and residue	DREA-BCL-NAR			X	X			X
Dilution tunnel scrapings	DREA-BCL-SDT			X	X			X

* Only performed if minimum of 15 mg sample available.

TABLE 4. LIST OF SAMPLES RECEIVED AND A BREAKDOWN OF ANALYSES FROM AIR ATOMIZING BURNER. FUEL: TRUCK CRANKCASE OIL (Run E062581)

Sample Description	ID Number	Extraction	TCO GRAV IR	AAS (Hg)	AAS (Sb/As)	SSMS	LC-IR-LRMS*	ICAP
Condensate & 1st impinger	DREA-BCL-CD-O/HI	X	X	X		X		X
2nd & 3rd impingers	DREA-BCL-AI			X	X			X
XAD-2 & module rinse	DREA-BCL-MR/XR	X	X	X		X	X	
Particulate filters #1-12 & 1μm cyclone catch	DREA-BCL-PFa1/12/1C	X	X	X		X		X
3 μm, 10 μm cyclone catch	DREA-BCL-3C/10C	X	X	X		X		
Dilution filters #31-42	DREA-BCL-DF31/42	X	X	X		X	X	X
Probe rinse	DREA-BCL-PR							

* Only performed if minimum of 15 mg sample available.

samples from the dilution tunnel, hereafter called "dilution filters". Also extracted was the 3-10 μm particulate catch from the air atomizing heater tests; however, there was insufficient cyclone material from the vaporizing pot heater tests to perform any organic analyses. On all extracts, total chromatographic organics (TCO) and gravimetric (GRAV) analyses were performed to establish total organic content, and infrared (IR) spectra were obtained to determine organic functional groups. The only exception to the above are the SASS particulate filters and probe rinses which did not receive TCO analysis since the temperature at which they were sampled precluded the presence of volatile materials.

Any sample containing 15 mg or more of available organic material (that is, 15 mg excluding material already used in the TCO, GRAV, and IR procedures) was separated by liquid chromatography (LC) into seven fractions of increasing polarity. Each LC fraction was then analyzed by TCO, GRAV, and IR. In addition, any fraction or combination of two fractions (2 & 3, 4 & 5, and 6 & 7) which contained 0.5 mg/m^3 organic material at the source was analyzed by low resolution mass spectrometry (LRMS). As previously mentioned, specific analyses performed on each sample are delineated in Tables 1 through 4.

INORGANIC ANALYSIS

The analysis included: spark source mass spectroscopy (SSMS) using an AEI Model MS-702R instrument to screen elemental constituents; inductively coupled argon plasma (ICAP) spectrometry using a Jarrell-Ash Model 975 instrument to analyze elemental species; atomic absorption spectroscopy (AAS) using a Perkin-Elmer Model 5000 instrument to provide mercury (Hg), arsenic (As), and antimony (Sb) emissions data.

Samples, analyzed by spark source mass spectrometry (SSMS) (74 elements) and atomic absorption spectrometry (AAS) (for mercury), were the SASS particulate filters, probe rinses, XAD-2 sorbents, combined module condensate and 1st impinger solutions, pot residues, 3-10 μm particulate catch (except the vaporizing pot/automotive test) and dilution filters. The vaporizing pot/automotive test did not generate any 3-10 μm particulate. Mercury, antimony, and arsenic were determined by AAS in the combined 2nd and 3rd impinger solutions, pot residues, both fuels and for two samples from corrosion of the dilution tunnel inlet tube. The latter two samples were a scraping from the inner surface of the dilution tunnel inlet tube and a nitric acid rinse of this same surface. These were taken to clarify if corrosion of the inlet tube could contribute to the composition of the effluent when sampled by the dilution tunnel. Appropriate blanks were run for all analyses.

Inductively coupled argon plasma (ICAP) for more precise analysis of elemental species (a Level II procedure) was specified by the EPA project officer on selected samples: the fuel oils, combined SASS particulate samples, 1st impinger solution combined with the module condensate, pot residues, combined 2nd and 3rd impinger solutions, and the dilution filters. No sample blanks were analyzed by ICAP. The ICAP instrument used for these analyses was configured for the determination of 30 elements. Analyses were conducted for 28 elements, excluding mercury and bismuth.

SECTION 4

RESULTS AND DISCUSSION

Results are compiled under three major areas: stack sampling techniques, chemical and physical analyses of the fuels, and chemical analysis of the effluents. Each area is treated separately.

SAMPLING

Sampling data pertinent to this report are summarized in Table 5. SASS trains sampled approximately 30 m^3 of each effluent with the exception of the air atomizing heater burning automotive crankcase oil (air atomizer/automotive) from which only 15.4 m^3 were sampled due to problems with air feed through the particulate filter. Larger sample volumes were collected in the dilution tunnel samples ranging from 80 m^3 for the vaporizer/truck to 126 m^3 for the vaporizer/automotive test.

The volumetric flow rate, Q, in m^3/sec was calculated using the fuel feed rate and the physical characteristics of the two fuels. The calculation used is given in Appendix C. Q was also calculated from the Alnor velometer reading. This value was not used in further calculations for this report as the Alnor can have a variance of 13% at the stack temperature used. However, Qs derived by the two methods agreed within 10%. All flow rates were very low.

FUEL ANALYSIS

Results of the fuel ultimate and proximate analyses are given in Table 6. Heating values for both truck and automotive crankcase oils are similar to those expected for a #2 fuel oil. Both oils are quite viscous (having high resistance to flow, approximately a factor of 30 more viscous than #2 fuel oil) and have relatively high values for water (by the Karl Fischer method), ash, and sulfur; however, these are all expected in waste oils. The automotive waste oil had a lower carbon value (81.30%) as well as a higher hydrogen/carbon ratio than is expected for engine oils. Because of the unusual nature of this finding, the carbon determination was repeated and found to be correct.

Comparisons with literature (2) for density, heating value and hydrogen/carbon ratios suggests that these two waste oils are similar to #4 fuel oil in their combustion properties.

Both crankcase oils were also analyzed by ICAP and AAS to determine fuel elemental mass values for calculating the mass balance of elemental species

TABLE 5. SAMPLING DATA

Sampling Condition	Vaporizing Burner		Air Atomizing Burner	
	Truck E050781	Automotive E052081	Automotive E061881	Truck E062581
Average stack temperature (°C)	416	414	339	332
Alnor reading (feet per minute at stack conditions)	412	424	275	288
Stack diameter (cm)	15.2	15.2	22.9	22.9
Total volume sampled (m^3) SASS	32	30	15	29
Total volume sampled (m^3) Dilution tunnel	80	126	77	117
Volumetric flow rate (Q) at STP (20°C, 1 atm.) m^3/sec	0.014	0.015	0.024	0.024
Fuel feed rate (gal/hour)	0.65	0.662	1.56	1.56

TABLE 6. ANALYTICAL RESULTS OF TRUCK AND AUTOMOTIVE CRANKCASE OIL SAMPLES*

Analysis Performed	ASTM Method	Truck	Automotive
BTU, Gross Per Pound	D240-76	19,045	18,747
BTU, Net Per Pound		17,857	17,523
BTU Gross Per Gallon		141,847	140,246
BTU, Net Per Gallon		132,999	131,090
API Gravity @ 60F	D1298-80	26.7	26.0
Density @ 15C, g/ml	D1217-81	0.8940	0.8979
Viscosity @ 40C, cs		65.45	67.74
Viscosity @ 40C, cp		57.36	59.76
Density @ 40C by pycnometer, g/ml		0.8764	0.8822
Karl Fisher Water, %	D1744-64	0.94	1.15
Ash, %	D1102	0.63	1.17
Carbon, %		86.46	81.30
Hydrogen, %		13.02	13.41
Nitrogen, %		0.070	0.116
Sulfur, %	D129-64		

* Analysis performed by Phoenix Laboratories, Inc., Chicago, Illinois.

in the fuels and emissions. The automotive crankcase oil contained much higher concentrations of metals than did the truck. Results are further discussed in the section containing inorganic analyses.

ORGANIC ANALYSIS

These emissions had relatively low organic loadings (just over 1 mg/m^3 at the source) and a chemical composition generally showing normal combustion products. This organic loading is less than conventional oil combustion in home units and less than effluents from coal combustion. The pot residue of the vaporizing heater is considered separately from the stack effluents.

Organic Loading

Organic loading as indicated by the SASS train samples was similar for all four test runs (see Figure 2) with the concentrations being slightly lower when burning automotive crankcase oil than with truck crankcase oil. For all tests, excluding the air atomizing/automotive test, dilution tunnel sampling indicated 20 to 30% less organic material than did the SASS train (see Figure 3). Both sampling methods indicated essentially the same concentration of organics in the air atomizing/automotive test. This test also had the lowest total organics of the four test runs as seen by the SASS train, and was the test in which only 15 m^3 were sampled by the SASS train. Both of these latter two conditions could effect the relative quantities of organics collected by the two sampling methods.

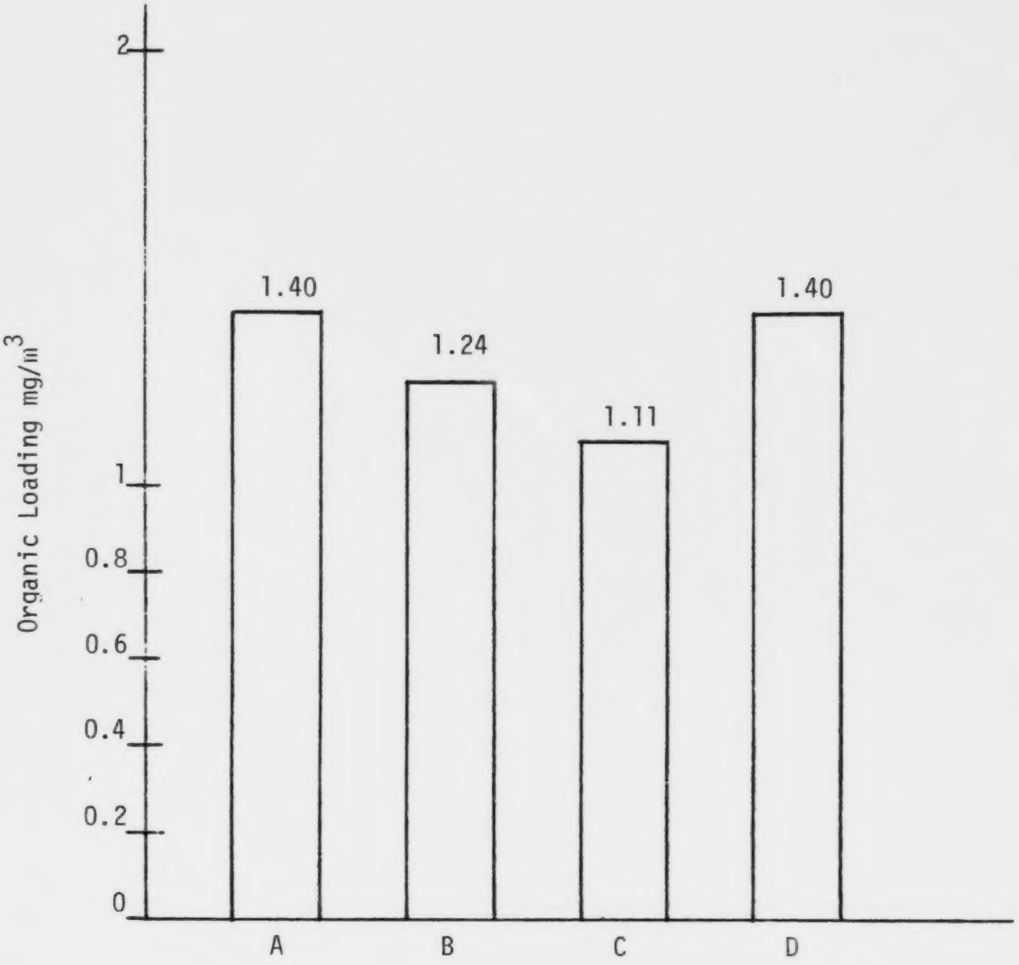
Although the pot residue from the vaporizing heater does contain significant concentrations of organics, this apparently does not diminish the organics in the stack, indicating that overall, the efficiency of the vaporizing heater is less than that of the air atomizing heater. Vaporizing burner/automotive pot residue had a much greater concentration of organics than the vaporizing burner/truck pot residue (601 mg/kg versus 61 mg/kg).

Because of the low organic loading, only 8 samples met the criterion of 15 mg required for liquid chromatography (LC) analysis. These were all the dilution filters, all of the XAD-2 sorbent modules (except from the air atomizing burner/automotive) and the pot residue from the vaporizing burner/automotive. After liquid chromatography, only 11 individual fractions (or combinations of two fractions) indicated sufficient concentration (≥ 0.5 mg/m^3 at the source) to require low resolution mass spectrometry (LRMS). Samples subjected to liquid chromatography and LRMS are summarized in Table 7.

Organic Composition

The organic data are summarized in Tables 8-12. All organic data, including organic summary tables, are in Appendix A.

The chemical composition of the organic portion of the samples from all four effluents, sampled by both SASS train and dilution tunnel, was generally similar. The two major types of constituents were hydrocarbons (mainly aliphatic, some olefinic and aromatic); and oxidized species such as ketones



A = Vaporizing burner-truck E050781
B = Vaporizing burner-automotive E052081
C = Air atomizing burner-automotive E061881
D = Air atomizing burner-truck E062581

FIGURE 2. RESULTS OF TOTAL ORGANICS FOR SASS TRAIN SAMPLES.

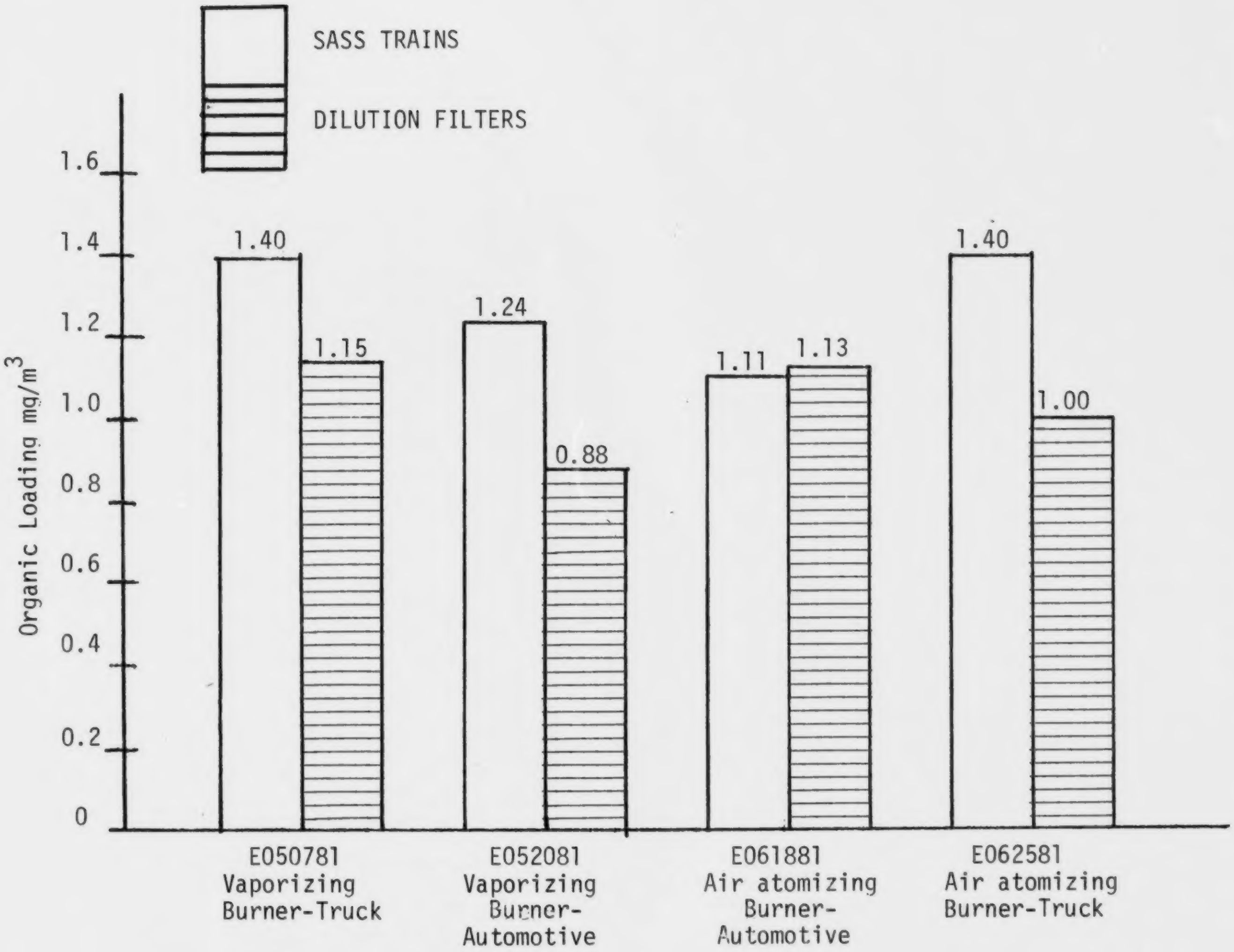


FIGURE 3. COMPARISON OF TOTAL ORGANICS FOR EACH TEST RUN SAMPLED BY SASS TRAIN AND DILUTION TUNNEL.

TABLE 7. SAMPLES REQUIRING LIQUID CHROMATOGRAPHY AND LOW RESOLUTION MASS SPECTROMETRY

	Vaporizing Burner				Air Atomizing Burner			
	Truck E050781		Automotive E052081		Automotive E061881		Truck E062581	
	LC	Fractions analyzed by LRMS	LC	Fractions analyzed by LRMS	LC	Fractions analyzed by LRMS	LC	Fractions analyzed by LRMS
XAD-2	Yes	-	Yes	6 and 7	No	-	Yes	6 and 7
Dilution filters	Yes	6 and 7	Yes	1 6 and 7	Yes	6 and 7	Yes	6 and 7
Bottom ash	No	-	Yes	1 2 and 3, 4 and 5, 6 and 7	N/A	-	-	N/A

TABLE 8. COMPARISON OF TOTAL ORGANICS (mg/m^3) FOR SASS TRAIN AND DILUTION FILTER SAMPLES FROM THE VAPORIZING BURNER/TRUCK TEST (E050781)

Compound Categories	SASS Train				Dilution Filter
	Particulate Filter *	Sorbent Module		Total	
		XAD-2	Condensate*		
Aliphatic hydrocarbons	0.03	1.12	0.1	1.25	0.66
Aromatic hydrocarbons		0.06$^+$		0.06	0.03
Ester	0.003	0.13	0.1	0.23	0.13
Ketone	0.003	0.03	0.1	0.13	0.10
Alcohol		0.01		0.01	
Acid		0.09		0.09	
Alkyl ether		0.12		0.12	
Carboxylic acid salts		0.77		0.77	
Benzoic acid		0.77		0.77	
Lactone		0.07		0.07	0.09
Olefin		0.01		0.01	0.02
Palmitic (or other C_{16} acid)					0.01
Stearic (or other C_{18} acid)					0.01
Ether					0.01
Aldehyde	0.003	0.1		0.103	
Substituted cyclohexane					0.11
Total of columns	0.04	3.28	0.3	3.61	1.17
Total from TCO and Grav	0.03	1.28	0.091	1.37	1.15

*Concentrations estimated from IR and total TCO and GRAV data only.

+Subsequent mass spectral analysis indicates that up to 150 $\mu g/m^3$ of these aromatic hydrocarbons are polynuclear aromatic hydrocarbons (PAH).

TABLE 9. COMPARISON OF TOTAL ORGANICS (mg/m^3) FOR SASS TRAIN AND DILUTION FILTER SAMPLES FROM THE VAPORIZING BURNER/ AUTOMOTIVE TEST (E052081)

Compound Categories	SASS Train Particulate Filter *	Sorbent Module XAD-2	Sorbent Module Condensate*	Total	Dilution Filter
Aliphatic hydrocarbon	0.04	0.92	0.1	1.06	0.53
Aromatic hydrocarbon		0.04	0.01	0.05	0.03
Ester	0.04	0.14	0.01	0.19	0.11
Ketone	0.04	0.03	0.01	0.08	0.12
Carboxylic acid		0.72		0.72	0.01
Carboxylic acid salt		0.07		0.07	
Benzoic acid		0.79		0.79	
Lactone		0.01		0.01	
Olefin					0.01
Ether			0.1	0.1	0.02
Aldehyde					0.09
Anhydride		0.01		0.01	
Total of columns	0.12	2.73	0.23	3.08	0.92
Total from TCO and Grav	0.04	1.09	0.11	1.2	0.88

* Concentrations estimated from IR and total TCO and GRAV data only.

TABLE 10. COMPARISON OF TOTAL ORGANICS (mg/m^3) FOR SASS TRAIN AND DILUTION FILTER SAMPLES FOR THE AIR ATOMIZING BURNER / AUTOMOTIVE TEST (E061881)

Compound Categories	SASS Train					Dilution Filter
	Particulate Filter *	Cyclone Catch *	Sorbent Module		Total	
			XAD-2 *	Condensate*		
Aliphatic hydrocarbon	0.4		1.0	0.1	1.14	0.7
Aromatic hydrocarbon	0.004	0.03	0.1	0.1	0.20	0.03
Ester	0.004	0.01	1.0	0.1	1.1	0.04
Ketone				0.1	0.1	
Alcohol	0.004			0.1	0.10	0.01
Carboxylic Acid			1.0		1.0	0.17
Carboxylic acid salt						0.01
Lactone						0.02
Olefin			0.1		0.1	
Ether						<0.01
Alkyl benzenes						0.17
Total of columns	0.05	0.04	3.2	0.5	3.75	1.15
Total from TCO and GRAV	0.04	0.03	0.97	0.7	1.04	1.13

* Concentrations estimated from IR and total TCO and GRAV data only.

TABLE 11. COMPARISON OF TOTAL ORGANICS (mg/m^3) FOR SASS TRAIN AND DILUTION FILTER SAMPLES FROM THE AIR ATOMIZING BURNER/TRUCK TEST (E062581)

	SASS Train					Dilution Filter
	Particulates		Sorbent Module		Total	
Compound Categories	1 μm *	3-10 μm *	XAD-2	Condensate*		
Aliphatic hydrocarbon	0.03	0.02	0.92	0.1	1.07	0.56
Aromatic hydrocarbon	0.003	0.002	0.10	0.01	0.115	0.05
Ester	0.03	0.002	0.11	0.1	0.24	0.05
Ketone	0.03	0.02			0.03	
Alcohol	0.003	0.002			0.01	
Carboxylic acid			0.62	0.1	0.72	0.17
Carboxylic acid salt			0.22		0.22	
Lactone			0.07		0.07	0.03
Olefin			0.01	0.01	0.02	
Aldehyde						0.01
Alkyl benzenes						0.15
Primary Amine Salt			0.06		0.06	
Total of columns	0.096	0.046	2.05	0.32	2.494	1.02
Total from TCO and Grav	0.030	0.018	1.23	0.118	1.348	1.00

* Concentrations estimated from IR and total TCO and GRAV data only.

TABLE 12. COMPARISON OF TOTAL ORGANICS (mg/kg) FOR TWO POT RESIDUES

Compound Categories	Vaporizing Burner-Truck* (E050781)	Vaporizing Burner-Automotive (E052081)
Aliphatic hydrocarbon	61.3	344
Aromatic hydrocarbon	0.61	142
Ester	6.13	4.84
Ketone	6.13	10.6
Carboxylic acid		10.6
Benzoic acid		43.9
Lactone	6.13	
Olefin		187
Palmitic acid		4.39
Stearic acid		
Aldehyde		11.0
Sulfur		59.6
Alkyl-PAH		8.29
Naphthalene		6.65
Alkyl-PAH-3-ring		66.5
PAH-3-ring		6.65
PAH		43.9
Total of columns	80.3	952
Total from TCO and Grav	61.3	601

* Concentrations estimated from IR and total TCO and GRAV data only.

esters,aldehydes, acids, and to a lesser extent, ethers, anhydrides, alcohols, and lactones. One compound type of an unusual nature and of possible significance from a health standpoint was a primary amine salt found in the sorbent column of the air atomizing burner/truck. PAH was found in the pot residue of the vaporizing burner/automotive and in the sorbent column from the vaporizing burner/truck tests. Because the PAH found in the pot residue does not enter the stack and therefore does not enter the air, it is only relevant to disposal of the pot residues. However, the PAH found in the sorbent column of the SASS train from the vaporizing burner/truck test could be significant. It should be considered that infrared analysis did indicate the presence of aromatic ring compounds in many of the samples including LC Fractions 2 and 3 of most of the liquid chromatographed samples. This finding indicates that PAHs and related compounds could be present, although in very low concentrations confirmed by EPA spot test results. Specific differences are looked at comparing the three major test parameters: air atomizing versus vaporizing heaters, truck versus automotive crankcase oils, and SASS train versus dilution tunnel sampling.

Air Atomizing Versus Vaporizing Heaters--

Some differences in organic composition were noted in comparing the two heater types. Alkyl benzenes were found only in air atomizing effluents. Benzoic acid was identified in two of the samples, however, benzoic acid is identified only after liquid chromatographic separation. Since this separation was not performed on the XAD-2 blank in this study, benzoic acid was not specifically identified in this blank. Therefore it is unknown what concentration of carboxylic acid present in the XAD-2 extract is coming from the stack as opposed to an extraction product of the XAD-2 itself.

Fraction 3 of the XAD-2 extract for the vaporizing burner truck test showed significant concentrations of organic materials. No other Fraction 3 for any other test contained similar quantities. Because Fraction 3 may contain PAH, a mass spectral analysis was performed to confirm or deny the presence of PAH. Results showed that the majority of material in this fraction was indeed PAH. Thus, the vaporizing burner truck test was the only test showing PAH in the gaseous effluent. This does not negate the fact that in in the pot residues, the vaporizing burner automotive test showed far more PAH than did the truck test.

Truck Versus Automotive Crankcase Oils--

Two compound types were seen in considerably higher concentrations in the truck than in the automotive effluents. These were acid salts and lactones, both highly oxidized species. Ethers were more commonly identified in the automotive samples than in the truck samples.

SASS Train Versus Dilution Tunnel Sampling--

As previously mentioned, for the automotive samples, much less aliphatic hydrocarbon is collected by dilution tunnel than by SASS train sampling, indicating the possibility of chemical transformation of sampling losses. Higher concentrations of esters were collected by SASS train than by dilution tunnel,especially for air atomizer/automotive which had 1.10 mg/m^3 by SASS train compared to 0.04 mg/m^3 by dilution tunnel. In fact, this SASS train value was significantly higher than any other of the ester concentrations.

The SASS trains also collected more alcohols than the dilution tunnels. Benzoic acid was found only in SASS train samples (see previous discussion).

Vaporizing Burner Pot Residues--

Comparison of the two pot residues is complicated by the fact that the vaporizing/automotive sample had significant sample for LC whereas the vaporizing/truck sample did not. For both pot residues, the major constituent is aliphatic hydrocarbons. Vaporizing/automotive also has high concentrations of olefinic and aromatic hydrocarbons, including PAHs. The vaporizing/truck appears to have a relatively higher concentration of oxidized species including esters, ketones, and lactones. It is important to again note that whatever the concentration of organics in the pot residue, it does not affect the concentration of organics in the stack.

INORGANIC ANALYSIS

Atomic absorption spectrometry (AAS) and spark source mass spectrometry (SSMS) are the two methods specified by EPA Level 1 guidelines (1) for analysis of inorganics. AAS was used to determine mercury, antimony, and arsenic. SSMS is the method which Level 1 guidelines specify for the determination of elements other than mercury, arsenic, and antimony. SSMS is useful for the determination of a majority of elements (71) in a single analysis and thus is inexpensive on a per element basis.

Analytical Accuracy

The trade-off in using SSMS, which is a rapid, inexpensive, and comprehensive method, is a less than optimum accuracy and precision. Work done for the Department of Energy by Battelle (Contract No. AC01-77ET10386) entitled, "Emissions and Efficiency Performance of Industrial Coal Stoker Fired Boilers" included a study of the reproducibility of SSMS data. Five replicate runs were made and relative standard deviations computed for 59 elements. The majority of elements (65%) had relative standard deviations (RSDs) between 31 and 70%. Ten percent had RSDs greater than 70% and 25% had RSDs equal to or less than 30%.

Inductively coupled argon plasma (ICAP) is a relatively new method by which multielement analysis can be done (3). At Battelle, ICAP is currently configured to analyze for 28 elements. Many of the samples from these tests were analyzed by both SSMS and ICAP for comparison. A study similar to that described for SSMS was done for 23 elements by ICAP (EPA Contract No. 68-03-2552; "Development of a Methodology for the Evaluation of Solid Waste"). In this case, 66% of these elements showed RSDs of 1-5%. Seventeen percent had RSDs of less than 1% and 17% had RSDs greater than 5%.

Atomic Absorption Spectrometry

AAS results are summarized in Tables 13-16. Antimony was neither detected in any of the four effluents nor in either fuel. However, low concentrations were found in both pot residues: 6 μg/g in the test burning truck crankcase oil and 26 μg/g in the test burning automotive crankcase oil. The source of this antimony is unknown.

TABLE 13. INORGANIC DATA BY AA FOR VAPORIZING BURNER - TRUCK RUN E050781

Sample	Hg ($\mu g/m^3$)	As ($\mu g/m^3$)	Sb ($\mu g/m^3$)
Sample			
1st impinger and condensate	0.04	NA	NA
2nd and 3rd impingers	0.01	ND	ND
Particulate filter	ND	NA	NA
3 μm to 10 μm cyclone catch*	NA	NA	NA
XAD-2	ND	NA	NA
Pot residue	1.5 μg/g	0.5 μg/g	6 μg/g
Dilution filters #13-14	ND	NA	NA
Truck waste crankcase oil	ND	0.3 μg/g	ND
Blanks			
1st impinger blank	ND	NA	NA
2nd and 3rd impingers	1.6 μg/L	ND	ND
Particulate filter	ND	NA	NA
XAD-2	0.02 μg/g	NA	NA
Dilution filter	1.76 μg/filter	NA	NA

NA - Not analyzed

ND = Not detected

* = Insufficient sample collected for AAS analysis

TABLE 14. INORGANIC DATA BY AA FOR VAPORIZING BURNER-AUTOMOTIVE
Run R052081

Sample	Hg ($\mu g/m^3$)	As ($\mu g/m^3$)	Sb ($\mu g/m^3$)
1st impinger and condensate	ND	NA	NA
2nd and 3rd impingers	ND	0.05	ND
Particulate filters #5-6	0.03	NA	NA
3 µm to 10 µm cyclone catch *	NA	NA	NA
XAD-2	0.05	NA	NA
Pot residue	1.4 µg/g	2.8 µg/g	26 µg/g
Dilution filters #16-17	0.36	NA	NA
Automotive waste crankcase oil	ND	0.6 µg/g	ND

ND = Not detected

NA = Not analyzed

* = No sample collected

TABLE 15. INORGANIC DATA BY AA FOR
AIR ATOMIZING BURNER-AUTOMOTIVE
Run E061881

Sample	Hg ($\mu g/m^3$)	As ($\mu g/m^3$)	Sb ($\mu g/m^3$)
1st impinger and condensate	ND	NA	NA
2nd and 3rd impingers	ND	0.25	ND
Particulate filters #7-17	0.44	NA	NA
3 μm to 10 μm cyclone catch	0.01	NA	NA
XAD-2	12	NA	NA
Dilution filters #18-29	0.20	NA	NA
Nitric acid residue	0.11 μg/g	NA	NA
Dilution tunnel scraping	1.2 μg/g	NA	NA

ND = Not detected

NA = Not analyzed

TABLE 16. INORGANIC DATA BY AA FOR AIR ATOMIZING BURNER-TRUCK Run #062581

Sample	Hg ($\mu g/m^3$)	As ($\mu g/m^3$)	Sb ($\mu g/m^3$)
1st impinger and condensate	0.06	NA	NA
2nd and 3rd impingers	ND	0.32	ND
Particulate filters #1-12 and 1μm cyclone catch	0.27	NA	NA
3 μm to 10 μm cyclone catch	ND	NA	NA
XAD-2	0.94	NA	NA
Dilution filters #31-42	0.05	NA	NA

ND = Not detected

NA = Not analyzed

Arsenic was detected in both fuels: 0.3 μg/g in the truck and 0.6 μg/g in the automotive. For the vaporizing burner, arsenic was detected in both pot residues although in low concentration. Arsenic was not detected at all in the vaporizing burner/truck effluent and at a very low level (0.05 $\mu g/m^3$) in the vaporizing burner/automotive effluent. However, arsenic was detected in higher concentrations for the air atomizing heater: 0.25 $\mu g/m^3$ when burning automotive fuel and 0.32 $\mu g/m^3$ when burning truck fuel. These are still well below the threshold limit value of 200 $\mu g/m^3$ established for arsenic. This disproportion of arsenic from the two heaters actually is part of a trend: metals were generally present in greater concentration in the air atomizing stack. This result was expected since the air atomizing heater atomizes the fuel before combustion and no pot residue is produced.

All of the effluents and the pot residues indicate very low levels of mercury. This is interesting in view of the fact that neither fuel contains any mercury. However, several blanks (2nd and 3rd impingers, XAD-2, and dilution filter) do contain mercury, although the blank value is subtracted before reporting sample values. Also, there is some mercury in the scraping from the dilution tunnel inlet tubes. Since all values are well below the threshold limit value of 50 $\mu g/m^3$ the levels of mercury are not of paramount interest. Nonetheless the origin of mercury in both the blanks and stack effluent is unknown.

Spark Source Mass Spectrometry

SSMS data are given in Appendix B. Metals for all runs were quite high; due to its design, the air atomizing heater causes more of the trace metals to be discharged from the stack than the vaporizing heater. This is logical since many metals remained in the pot residue of the vaporizing heater. One problem arose concerning SSMS. Due to an instrument malfunction, beryllium could not be detected by SSMS. Correcting this malfunction would have entailed a significant delay. ICAP, however, was also used to analyze beryllium and none was detected in any of the samples. This was discussed with the EPA Project Officer and it was decided to proceed without beryllium determination by SSMS. Further details concerning concentrations of specific elements are given in the section comparing SSMS and ICAP.

Inductively Coupled Argon Plasma

ICAP data are given in Appendix B. Results by ICAP for each SASS train, dilution tunnel and fuel were calculated relative to quantity of fuel burned. That is,

$$\frac{\text{total quantity of element detected } (\mu g)}{\text{total quantity of fuel burned (g)}}$$

These are graphically illustrated in Figures 4 through 13 (numerical values used to generate these Figures are given in Appendix B). This elemental mass balance was done using ICAP only, since the fuels were analyzed by ICAP and not by SSMS, and since ICAP is much more precise than SSMS.

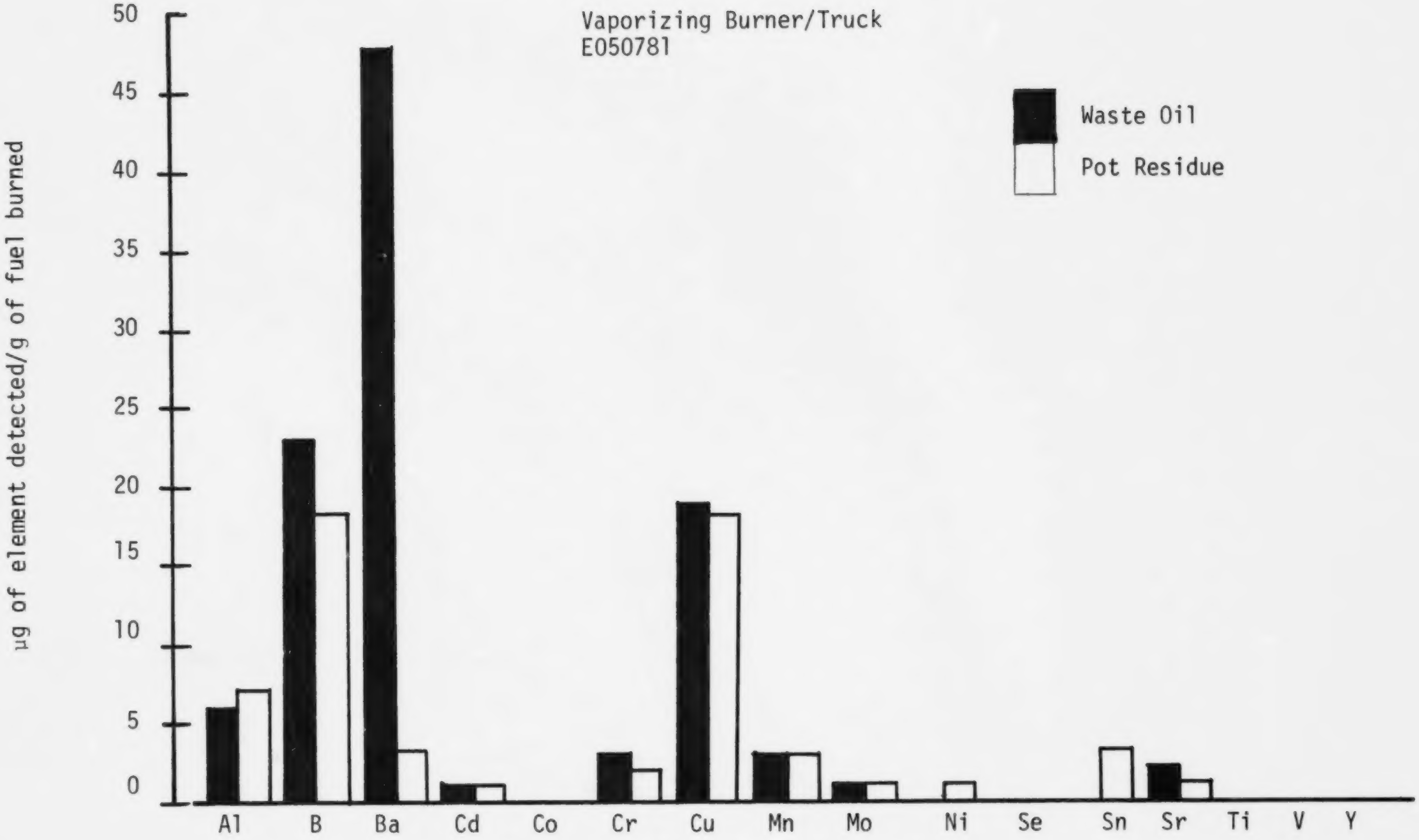


FIGURE 4. COMPARISON OF TOTAL MASS OF ELEMENTS DETERMINED BY ICAP FOR WASTE OIL AND POT RESIDUE IN THE VAPORIZING POT HEATER BURNING TRUCK CRANKCASE OIL (E050781).

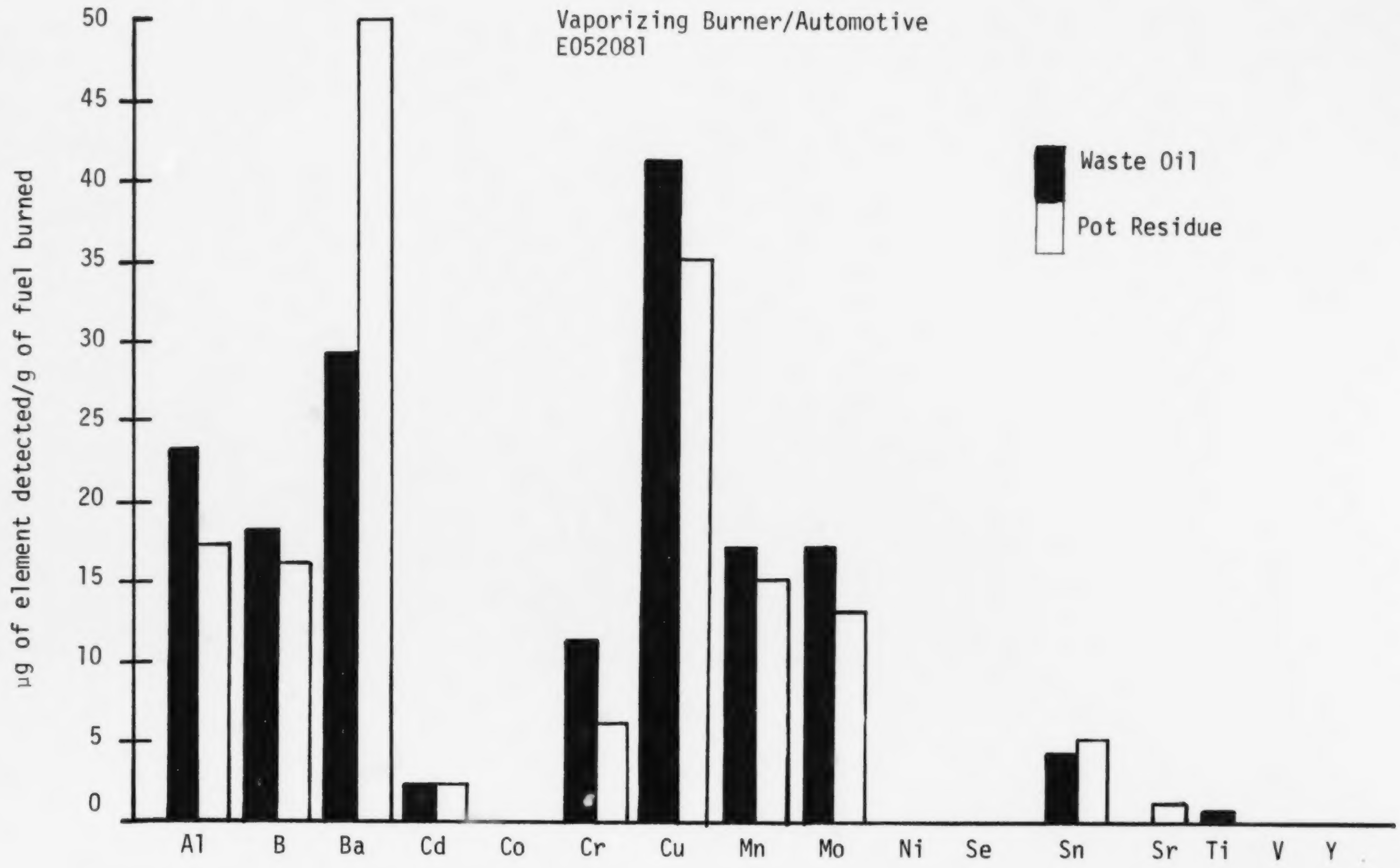


FIGURE 5. COMPARISON OF TOTAL MASS OF ELEMENTS DETERMINED BY ICAP FOR WASTE OIL AND POT RESIDUE IN THE VAPORIZING POT HEATER BURNING AUTOMOTIVE CRANKCASE OIL (E052081).

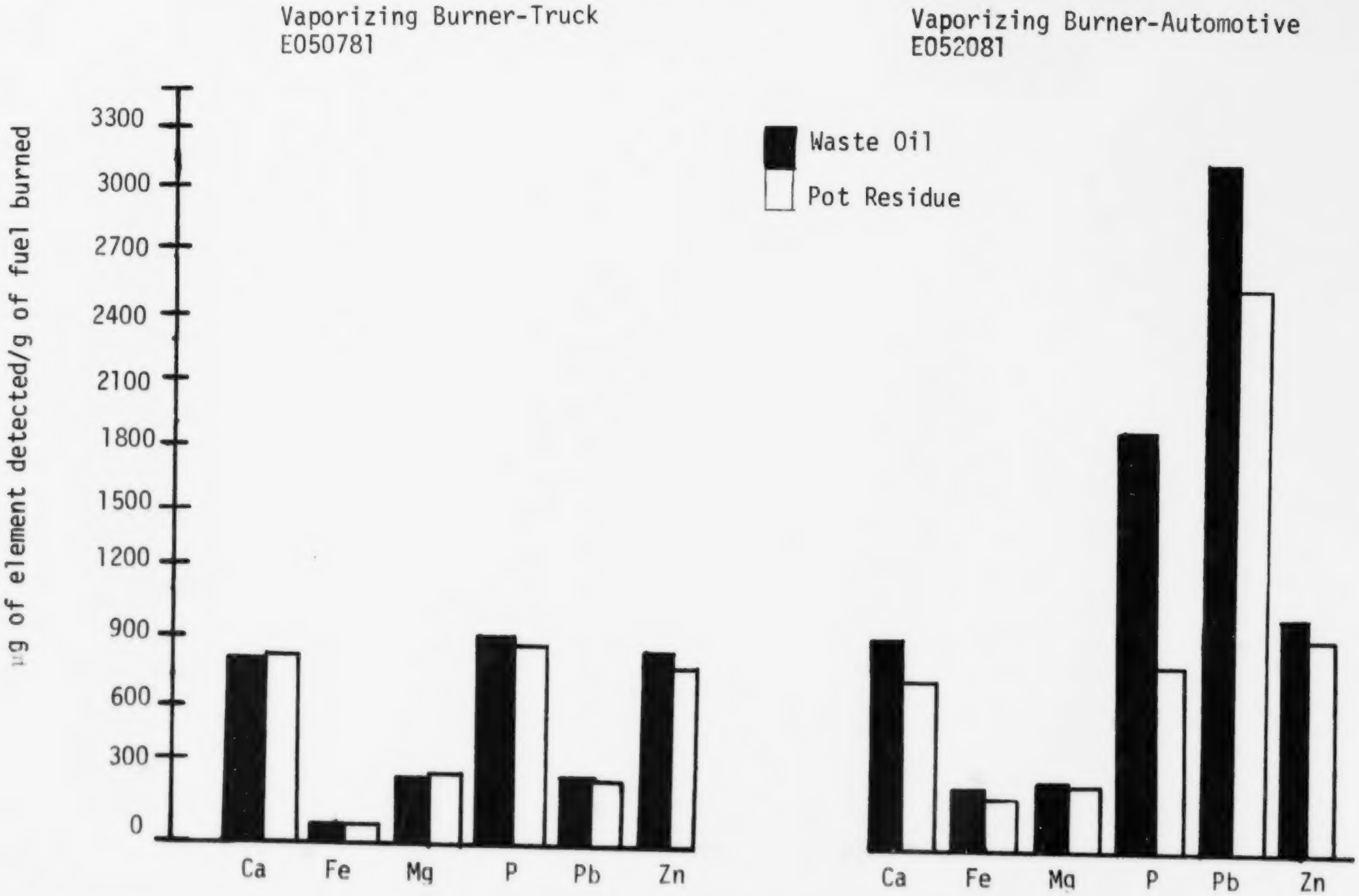


FIGURE 6. COMPARISON OF TOTAL MASS OF ELEMENTS DETERMINED BY ICAP FOR WASTE OIL AND POT RESIDUE IN THE VAPORIZING POT HEATER BURNING TRUCK (E050781) AND AUTOMOTIVE (E052081) CRANKCASE OILS.

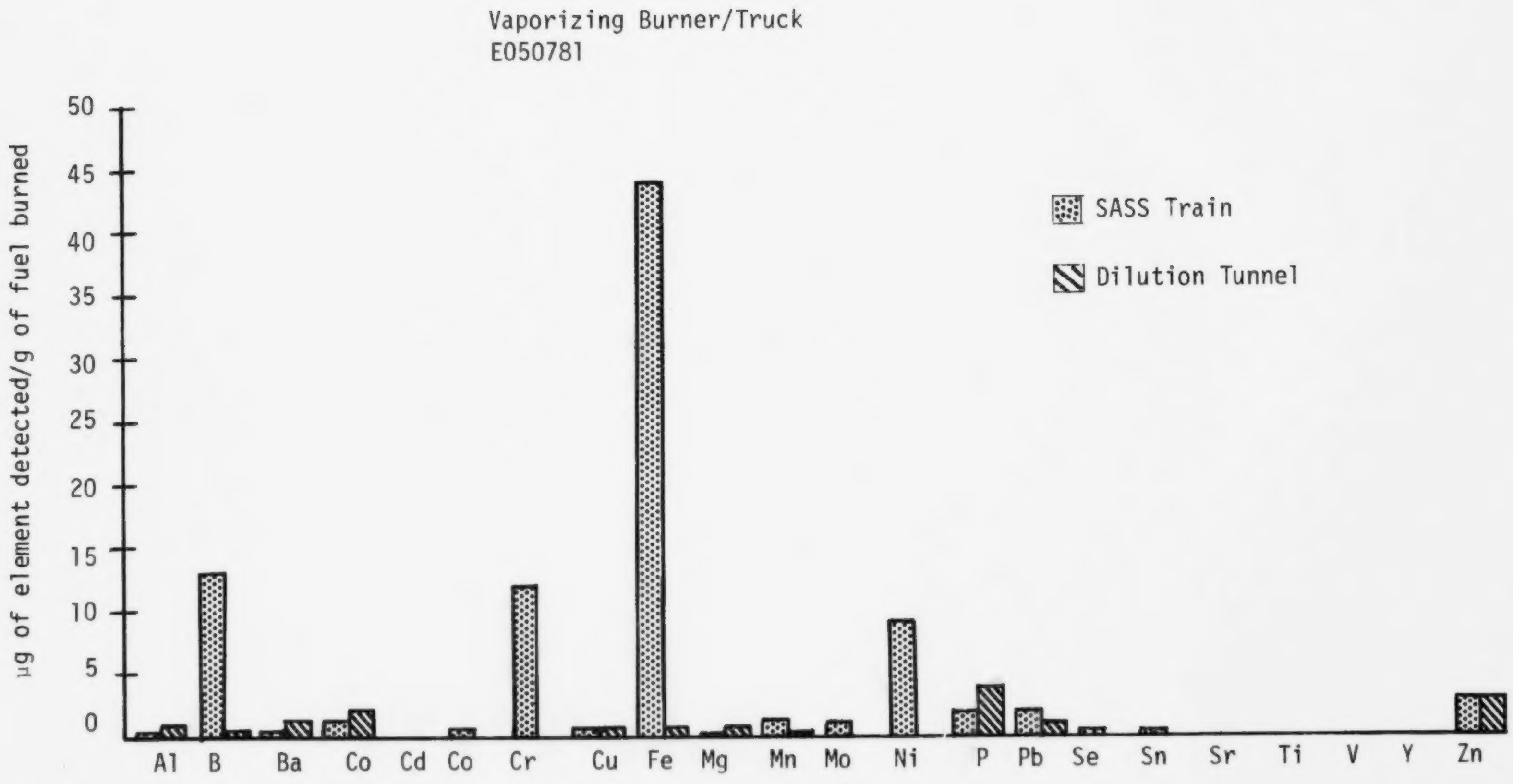


FIGURE 7. COMPARISON OF TOTAL MASS OF ELEMENTS DETERMINED BY ICAP FOR SASS TRAIN AND DILUTION TUNNEL SAMPLING FROM THE VAPORIZING POT HEATER BURNING TRUCK CRANKCASE OIL (E050781).

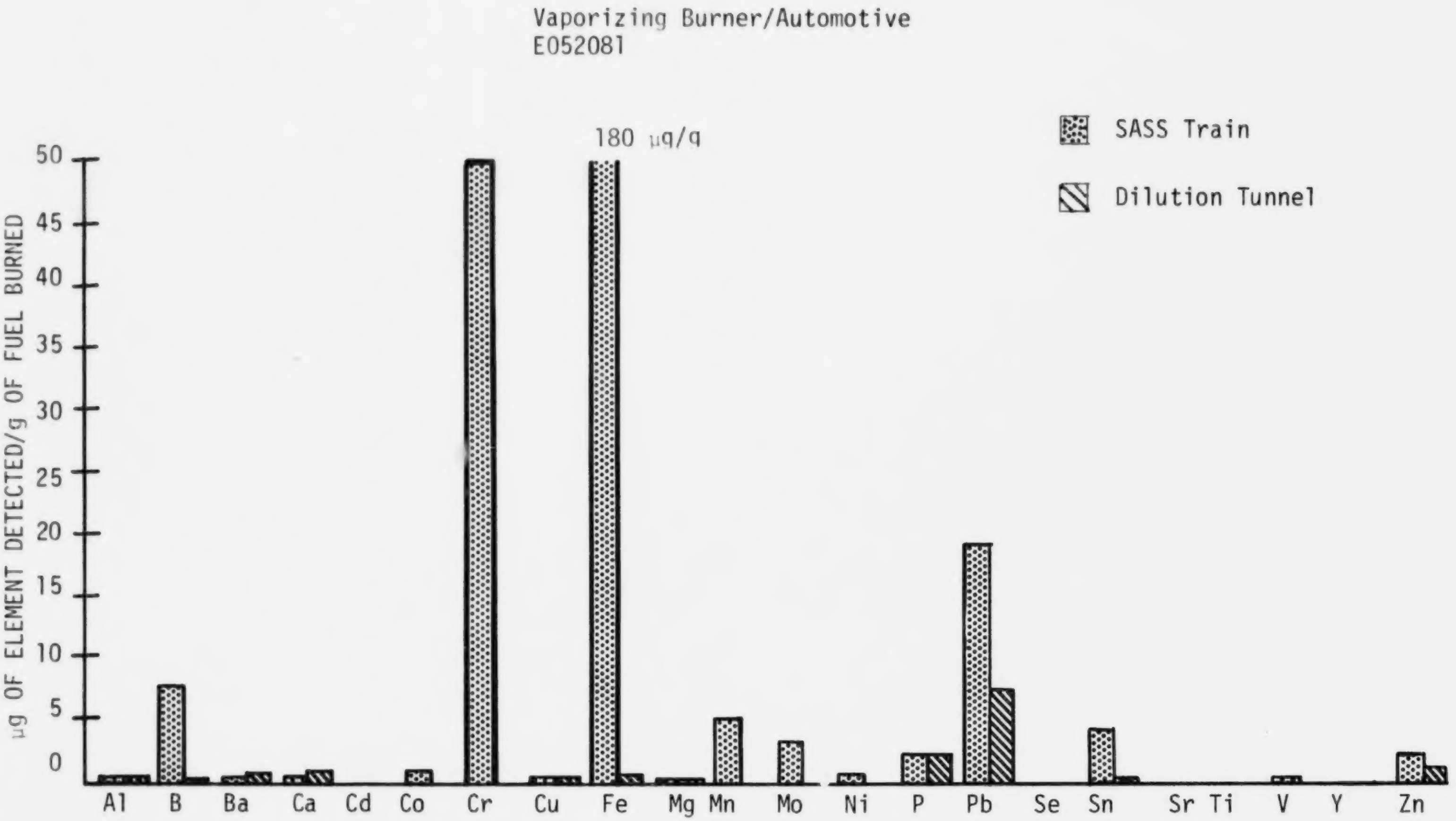


FIGURE 8. COMPARISON OF TOTAL MASS OF ELEMENTS DETERMINED BY ICAP FOR SASS TRAIN AND DILUTION TUNNEL SAMPLING FROM THE VAPORIZING POT HEATER BURNING AUTOMOTIVE CRANKCASE OIL (E052081).

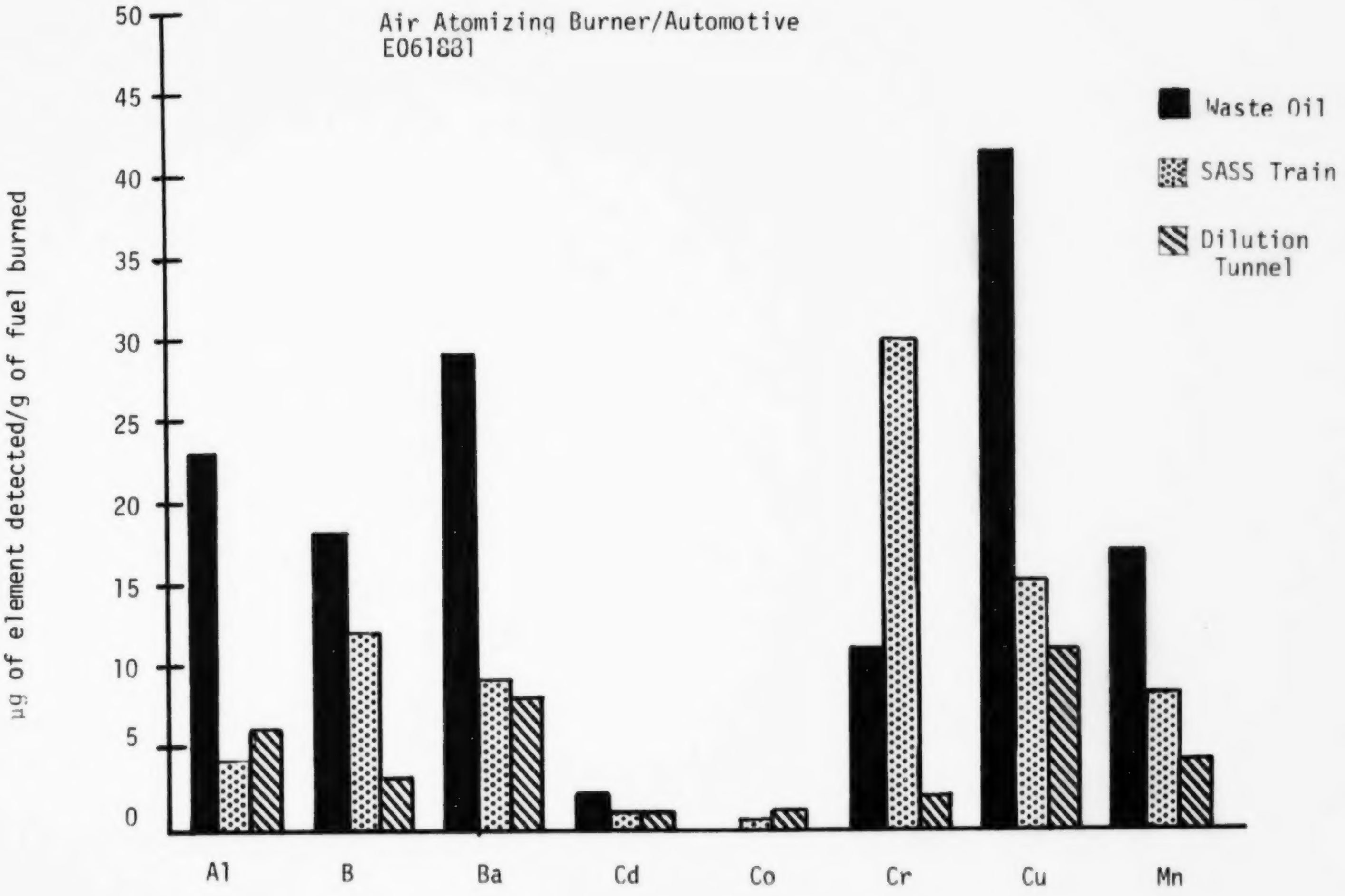


FIGURE 9. COMPARISON OF TOTAL MASS OF ELEMENTS DETERMINED BY ICAP FOR WASTE OIL, SASS TRAIN, AND DILUTION TUNNEL SAMPLES FOR THE AIR ATOMIZING HEATER BURNING AUTOMOTIVE CRANKCASE OIL (E061881).

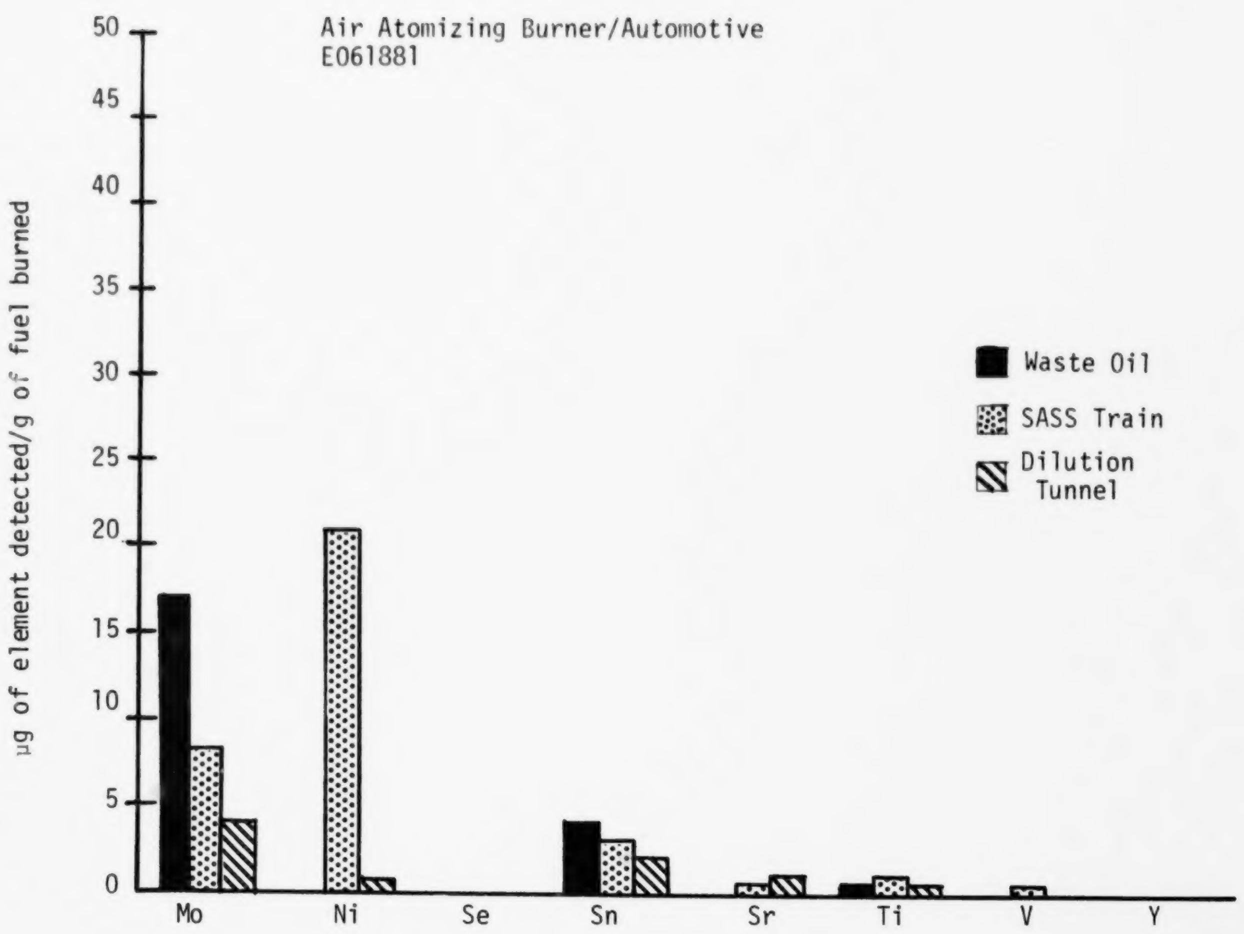


FIGURE 10. COMPARISON OF TOTAL MASS OF ELEMENTS DETERMINED BY ICAP FOR WASTE OIL, SASS TRAIN, AND DILUTION TUNNEL SAMPLES FOR THE AIR ATOMIZING HEATER BURNING AUTOMOTIVE CRANKCASE OIL (E061881).

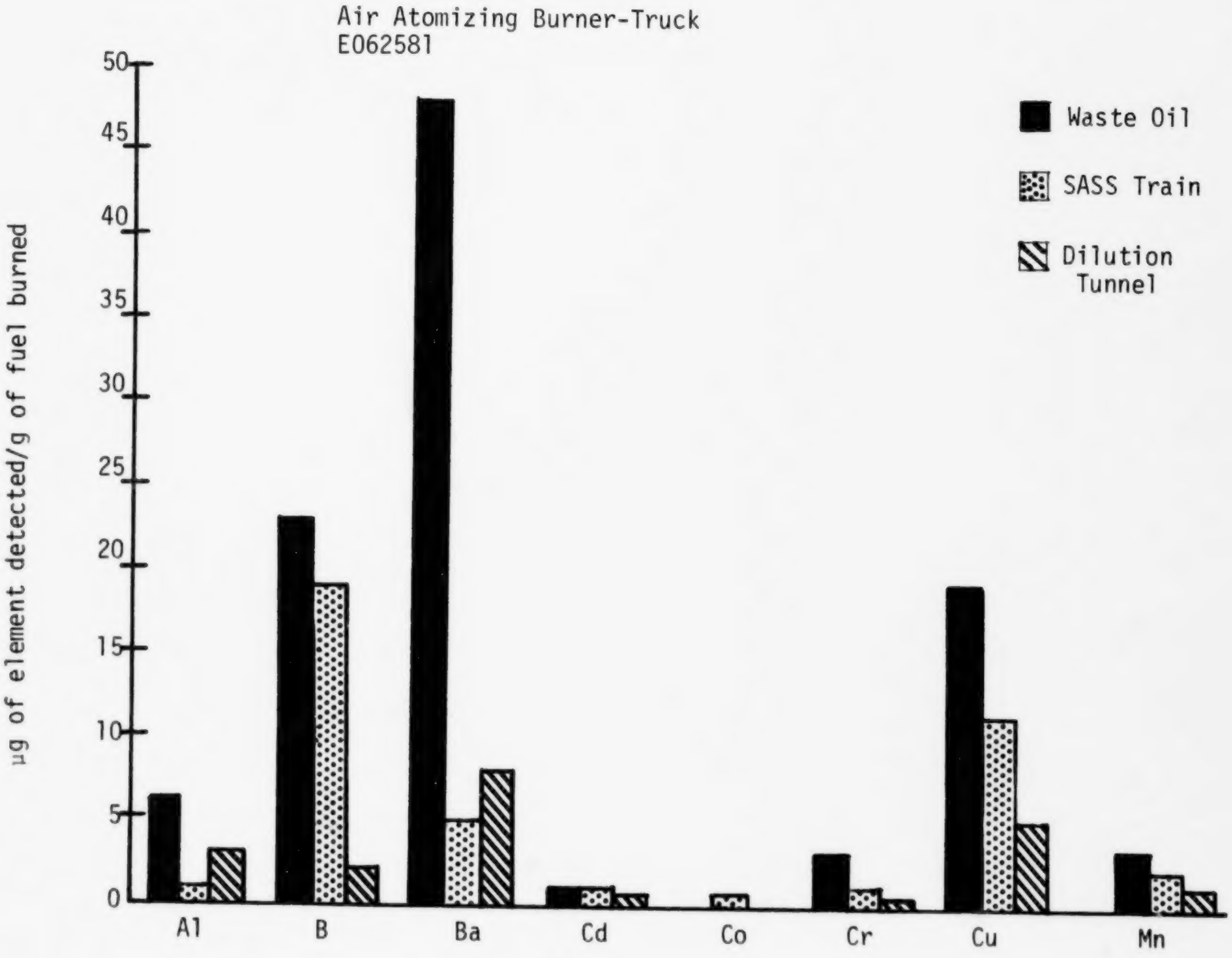


FIGURE 11. COMPARISON OF TOTAL MASS OF ELEMENTS DETERMINED BY ICAP FOR WASTE OIL, SASS TRAIN AND DILUTION TUNNEL SAMPLES FOR THE AIR ATOMIZING HEATER BURNING TRUCK CRANKCASE OIL (E062581).

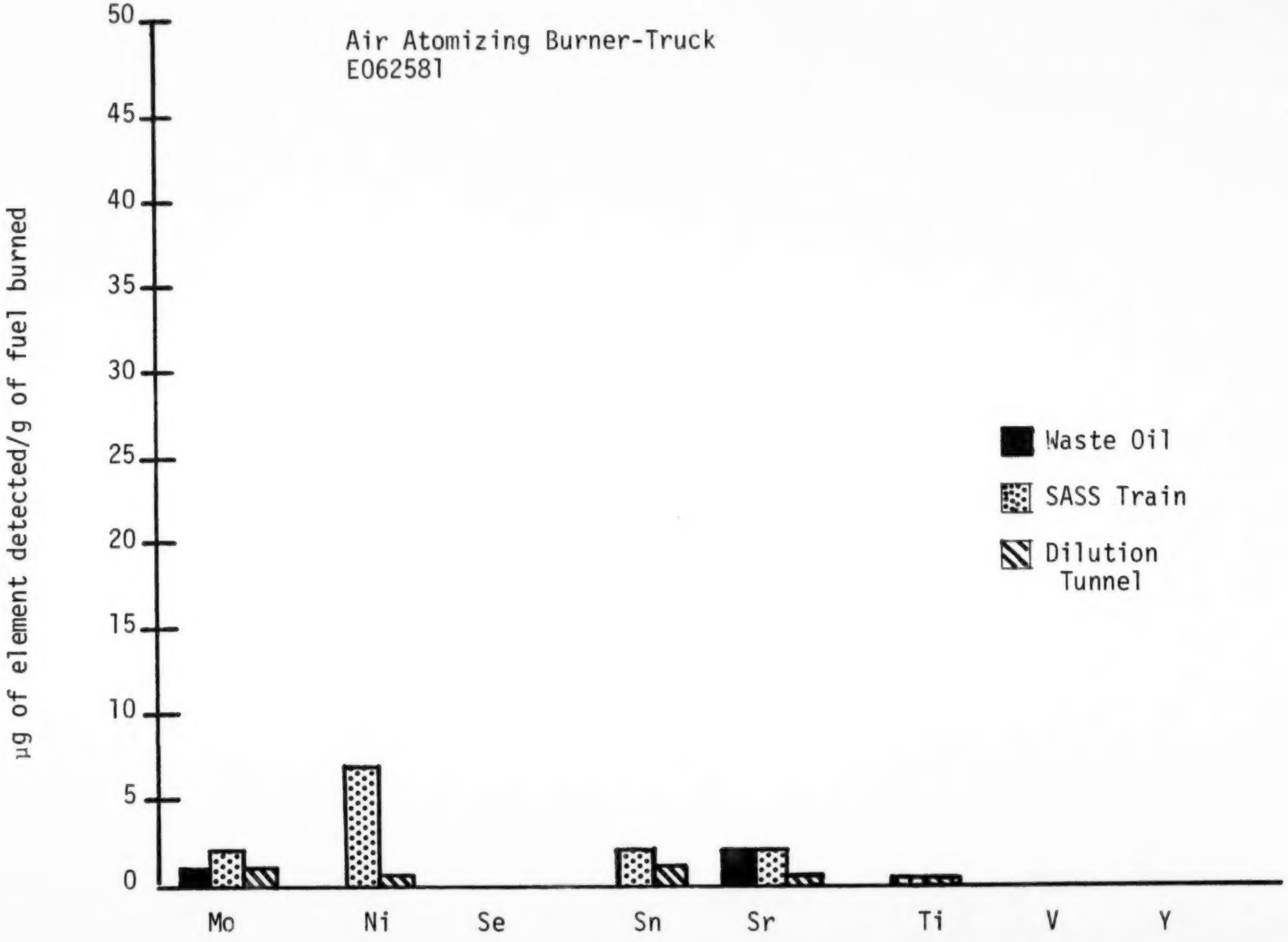


FIGURE 12. COMPARISON OF TOTAL MASS OF ELEMENTS DETERMINED BY ICAP FOR WASTE OIL, SASS TRAIN, AND DILUTION TUNNEL SAMPLES FOR THE AIR ATOMIZING HEATER BURNING TRUCK CRANKCASE OIL (E062581).

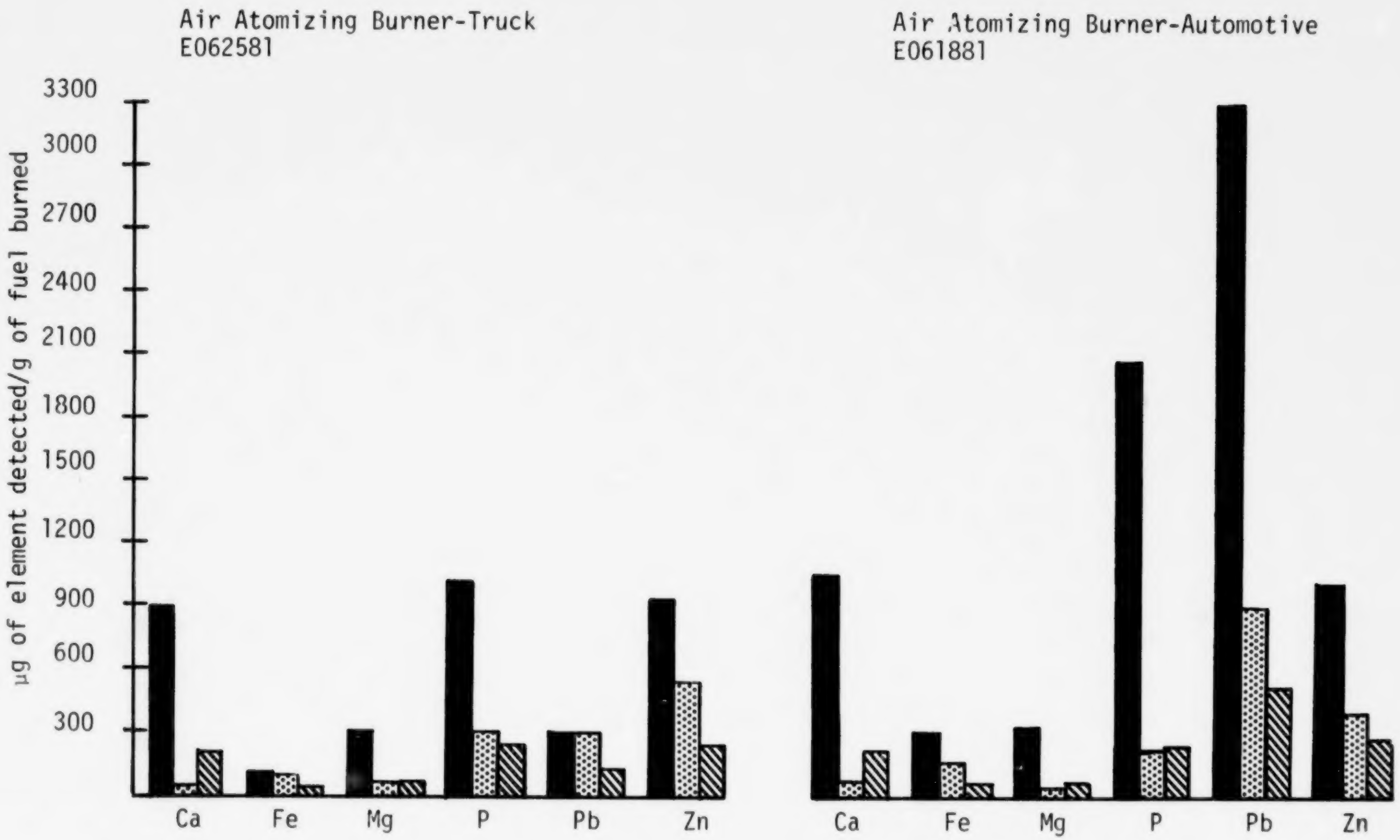


FIGURE 13. COMPARISON OF TOTAL MASS OF ELEMENTS DETERMINED BY ICAP FOR WASTE OIL, SASS TRAIN, AND DILUTION TUNNEL FOR THE AIR ATOMIZING HEATER BURNING AUTOMOTIVE AND TRUCK CRANKCASE OIL (E062581 and E061881).

Figures 3 through 5 show mass balances for the vaporizing heater fuels and pot residues (figure 5 includes elements from both test runs). Figures 6 and 7 show comparable data from the SASS trains and dilution tunnels. Two generalities can be made for the vaporizing heater:

1. Most of the metals from the fuel are retained in the pot residues rather than emitted from the stack.

2. More metals are collected by the SASS train than by the dilution tunnel.

For the vaporizing heater burning either fuel there are a few elements in both the pot residue and the SASS train samples which either are not in the fuel at all, or which exceed the quantity found in the fuel. There are three elements found in the SASS train samples which exceed significantly that found in the fuel; these are chromium, iron and nickel. Since these elements are 1) components of steel, 2)exceed fuel values only in the SASS train samples and 3)the SASS train is constructed of stainless steel, it is suspected that these three elements are being leached from the SASS train itself.

Figures 9 through 13 show mass balance data for fuels, SASS train and dilution tunnel samples from the air atomizing heater tests. The trend of greater mass collection by SASS train than by dilution tunnel is also seen in the mass balances for the air atomizing heater. For this heater, the total amount of each element detected is measured in the stack, since the air atomizing heater does not produce a pot residue. Not surprisingly, the concentrations of metals being emitted from the stack are much greater for this heater than for the vaporizing heater. Again, a few elements were detected in the effluent by both SASS train and dilution tunnel sampling which were not detected in the fuel. Also a very few exceeded quantities found in the fuel. However, the levels of iron, nickel and chromium do not exceed quantities in the fuel for the SASS train as seen within the vaporizing heater. This is probably because a much higher concentration of iron is being emitted from the air atomizing heater stack than from the vaporizing heater stack (due to methods of combustion) so that any possible leaching of the SASS train is not significant compared to stack effluent concentrations.

There was a suspicion that corrosion of the dilution tunnel inlet tube could be contributing to effluent concentrations of some elements. Table 17 shows the results of ICAP on both scrapings of the corrosion product itself and a nitric acid rinse of the corroded area. There is no indication that any of these elements are being leached into the dilution tunnel sample. However, there is a surprisingly high concentration of lead in these samples: 1850 μg/g in the scrapings and 16,000 μg/g in the nitric acid rinse. In addition, concentrations of lead indicated by dilution tunnel sampling are significantly lower than those indicated by the SASS train for all four test runs. This implies that some of the lead from the effluent is being deposited onto the dilution tunnel inlet tube.

Considering the variety of matrices requiring analysis (fuel, impingers, bottom ash, filters), the overall agreement shown in Figures 3 through 12 is excellent for most elements, and indicates the accuracy and precision available with ICAP. Mass balances are somewhat better for the vaporizing heater than for the air atomizing heaters apparently because the majority of metals are in the pot residue.

TABLE 17. METALS BY ICAP FOR DILUTION TUNNEL SCRAPINGS AND NITRIC ACID RINSE (Results reported in μg/g)

Element	Nitric Acid Rinse	Scrapings
Ag	3	2
Al	690	140
B	310	350
Ba	370	220
Be	ND	ND
As	8.4	20
Ca	32,000	2,700
Cd	15	3
Co	17	22.5
Cr	200	7.3
Cu	380	210
Fe	273,000	559,000
Mg	9,600	850
Mn	2,700	1,800
Mo	290	90.5
Na	16,000	3,700
Ni	190	235
P	21,000	2,550
Pb	16,000	1,850
Sb	34	27.5
Se	160	290
Sn	29	14.5
Sr	87	8.5
Ti	18	10
Tl	ND	ND
V	52	87
Y	3	4
Zn	8,100	1,350

Comparison of ICAP and SSMS

A total of 14 samples were analyzed by both methods including dilution filters, SASS particulate filters, combined 1st impinger and condensate solutions. For the most part, agreement was good; any concentration within a factor of three was considered to be equal. A factor of three was chosen because with only one data point for each value, the following had to be taken into account:

(1) possible non-homogeneity of sample,

(2) the 30-70% relative standard deviation of SSMS, and

(3) possible interferences.

For both ICAP and SSMS, interferences will usually enhance the signal although an iron interference (high for most of these samples) can generate low values by ICAP for some elements. Non-agreement generally did not show any pattern: sometimes ICAP was lower, sometimes SSMS was lower and disagreement of greater than a factor of three were found to occur at least once in 21 of 28 elements. There were four elements which did not match at least half the time: boron, lead, titanium, and calcium. Boron was higher in all samples by ICAP. This is expected because samples are subjected to an acid digestion in a glass vessel before ICAP. During this digestion, boron may be leached from the glass. The other three elements showing a high incidence of non-agreement also are consistently analyzed in higher concentration by either ICAP or SSMS as shown in Table 18.

TABLE 18. ELEMENTS WITH CONFLICTING SSMS AND ICAP CONCENTRATIONS

Element	Method of Highest Concentration	Occurance
Calcium	ICAP	12 of 14 analyses
Lead	ICAP	10 of 14 analyses
Titanium	SSMS	13 of 14 analyses

TLVs are issued and updated by the American Conference of Governmental Industrial Hygienists (ACGIH). These values refer to airborne concentrations and represent the maximum level that will allow repeated worker exposure, in this case for an 8 hour work day, without adverse effects. TLVs are based on the best available information from industrial experience, from experimental human and animal studies, and, where possible, from combinations of the three. The TLVs are generally species specific, in other words, zinc standards are specific to zinc chloride fume, zinc chromate, and zinc oxide fume. This implies a knowledge of speciation in order to make direct comparisons with emitted elements in the combustion gases.

TLVs could be useful in estimating potential health impacts from waste oil combustion since the operation of these devices often corresponds to a normal work day. However, it should be noted that most garages (where these heaters are often used) are open more than 8 hours a day, and usually six days a week. A better evaluation of human health risk would require advanced speciation of both organic and inorganic species generated in waste oil combustion, Level 2 testing and ground level modeling to show the direct human exposures.

Nine elements exceed TLVs as assigned by the ACGIH as indicated by both SSMS and ICAP data. These were cadmium, chromium, cobalt, copper, iron, lead, nickel, phosphorus, and zinc. Their concentrations are given in Table 19. Table 20 shows the specific species for which the TLVs were derived. It is important to note that TLVs have not been established for elemental species thus gas discharge concentrations and TLVs cannot be directly compared. Both SASS train and dilution tunnel samples again show generally higher metals emission by the air atomizing heater than by the vaporizing heater. For the most part, the air atomizing heater, when burning either fuel, exceeded the TLVs when sampled by the SASS train. The only real exception is cobalt in the air atomizing/truck test. Cobalt and cadmium in the air atomizing/automotive test and cadmium in the air atomizing/truck test exceed the TLVs when analyzed by ICAP but not by SSMS. Conversely, chromium in the air atomizing/truck test exceeded the TLV when analyzed by SSMS but not by ICAP. Fewer elements exceeded the TLVs when collected by dilution tunnel. This is because generally lower concentrations of all elements were collected by the dilution tunnel than by the SASS train.

As mentioned before, element stack emission values for the vaporizing burner were usually lower than those for the atomizing burner. For the SASS train samples collected while burning both truck and automotive fuel, five elements exceeded the TLV (either as indicated by SSMS, ICAP, or both). These were lead, chromium, nickel, iron, and cobalt. However, dilution tunnel samples showed only lead in the automotive test to exceed the TLV, again because of lower metals collection efficiency.

Cobalt and nickel exceeded their respective TLVs but neither was detected in the fuel. Several other metals were also found in the effluents in lower concentrations, but were not found in one or both fuels. The following are possible explanations for this phenomenon:

(1) Leaching of elements from the SASS train or dilution tunnel.

(2) As mentioned in the section concerning atomic absorption, some blanks contained materials which appeared in the effluents but not in either fuel, thus unequal subtraction of blank from sample values could contribute to the apparent concentration of these elements.

TABLE 19. COMPARISON OF DISCHARGE CONCENTRATIONS OF SOME ELEMENTS DETERMINED BY ICAP AND (SSMS) AND THE AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS THRESHOLD LIMIT VALUES * (ALL VALUES ARE REPORTED IN $\mu g/m^3$)

	Pb	P	Cr	Ni	Cu	Zn	Cd	Fe	Co
Threshold Limit Values (Time Weighted Averages)	150	1000	500	100	1000	5000	50	1000	50
SASS Trains									
Vaporizing Burner-Truck	197 (37.7)	205 (55.7)	1547 (86.7)	1104 (333)	16 (13.2)	450 (180)	- -	5641 (415)	21 (50)
Vaporizing Burner-Automotive	1604 (1040)	199 (183)	4198 (5150)	21 (660)	16 (27.3)	194 (387)	1	15180 (15500)	54 (73.9)
Air Atomizing Burner-Automotive	143,900 (796,000)	19440 (4670)	4954 (5710)	3548 (9240)	2377 (14500)	66210 (60000)	109 -	22280 (224,000)	72 (27.4)
Air Atomizing Burner-Truck	57740 (64000)	68710 (18600)	313 (558)	1560 (2550)	2377 (1320)	117400 (54000)	155 (42.7)	15510 (10100)	23 (13.8)
Dilution Filters									
Vaporizing Burner-Truck	124 (40.7)	522 (30.2)	0.92 (0.15)	4.46 (0.67)	11 -	341 -	0.33 -	48 (2.9)	2.20 (1.11)
Vaporizing Burner-Automotive	549 (6780)	170 (417)	0.65 (5.57)	- (18.4)	5.67 (22.9)	89 (810)	0.42 -	37 (271)	1.22 (1.40)
Air Atomizing Burner-Automotive	85800 (8700)	40460 (2900)	295 (58.1)	54 (14.3)	1764 (202)	45650 (5800)	86 -	9041 (724)	218 (8.69)
Air Atomizing Burner-Truck	23770 (3550)	50760 (5920)	79 (19.7)	32 (39.3)	1019 (394)	44630 (11800)	86 (3.55)	4374 (1970)	9 (1.95)

* "TLVs Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes for 1980", ACGIH, Cincinnati, OH, 1980, 94 pp.

TABLE 20. SPECIES FROM WHICH THRESHOLD LIMIT VALUES WERE DERIVED

Element	TLV Reference Composition
Lead	Inorganic, fumes and dusts (as Pb)
Phosphorus	Phosphoric acid
Chromium	Soluble chromic, chromous salts (as Cr)
Nickel	Soluble compounds (as Ni)
Copper	Dusts and mists (as Cu)
Zinc	Zinc oxide fume
Cadmium	Cadmium oxide fume (as Cd)
Iron	Iron salts, soluble (as Fe)
Cobalt	Metal, dust and fume (as Co)

(3) The high temperatures attained on combustion may facilitate leaching of elements from the walls of the heaters.

(4) These elements may have been present in a fuel previously burned in these heaters. This is doubtful however, since they were new units.

(5) Contamination of the sample may be occurring although this is unlikely given the consistent levels of some of these elements.

(6) A combination of the above or some other mechanism altogether.

It should be pointed out that although several elements appear in the effluents which are not in the fuels, there are not any elements found in the fuel which are not in the effluents.

If the SSMS and ICAP values in Table 19 are compared using the factor of 3 criterion for a match, 45 percent are found to do so. Two points should be considered, however. First, that SSMS data include determination of elements in the XAD-2 which was not analyzed by ICAP. Therefore, SSMS should indicate higher values than ICAP. Secondly, if only SSAS train samples are compared, 65 percent of the SSMS and ICAP data match.

REFERENCES

1. Lentzen, D. E., D. E. Wagoner, E. D. Estes, and W. F. Gutknecht. IERL-RTP Procedures Manual: Level 1 Environmental Assessment (Second Edition). EPA/600-17-78-201, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, 1978. 263 pp.

2. Reed, R. D. Furnace Operations (Third Edition). Golf Publishing Company, Houston, Texax, 1978.

3. Federal Register, Monday, December 3, 1979, Inductively Coupled Plasma (ICP) Optical Emission Spectrometric Method for Trace Analysis of Water and Wastes, pp. 69559-69564.

APPENDIX A

TCO AND GRAV RESULTS

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5/7/81

Type of Source Vaporizing Pot /Truck

Test Number E050781 **Sample ID Number** KEA-BCL-XR/MR-E050781

Sample Description XAD-2 and module rinse

Original Sample Volume or Mass ~134 g

Analyst Responsible R. L. Barbour **Date Analyzed** 7/25/81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7/31/81

Column Flow Rate 1 ml/min **Column Temperature** 22°C

Observations

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	8.9	32.24	41.14	1.28
Taken for LC[2]	6.23	22.568	28.798	-
Recovered[3]	7.16	11.169	18.329	-

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration[5] mg/m^3
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1	1.9	0.1	1.8	2.574	0.402	0.05	0.36	0.51	3.27	0.10
2	1.7	0.03	1.67	2.388	0.060	0.04	0.02	0.03	2.15	0.07
3	1.2	0.02	1.18	1.687	1.158	0.02	1.13	1.62	4.75	0.15
4	0.7	0.14	0.56	0.801	0.645	0.02	0.62	0.89	2.49	0.08
5	0.7	0.03	0.67	0.958	1.023	0.02	1.00	1.43	3.72	0.12
6	0.9	0.04	0.86	1.230	7.179	0.01	7.17	10.25	21.78	0.68
7	0.5	0.08	0.42	0.601	0.876	0.02	0.86	1.23	3.01	0.09
Sum	7.6	0.44	7.16	10.239	11.343	0.17	11.17	15.968	41.17	1.29

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. These values were normalized.

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP   Sample Acquisition Date 5-7-81

Type of Source Vaporizing Pot /Truck

Test Number E050781   Sample ID Number KEA-BCL-XRB/MCB-E050781

Sample Description XAD-2 blank and CH_2Cl_2 blank

Original Sample Volume or Mass 60g

Analyst Responsible R. L. Barbour   Date Analyzed 7-10-81   Time

Calculations and Report Reviewed By R. J. Jakobsen   Report Date 7-31-81

Column Flow Rate   Column Temperature

Observations No liquid chromatography performed.

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	0.70	1.50	2.20	0.068
Taken for LC[2]				
Recovered[3]				

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/ $(m^3$, L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

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LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP

Sample Acquisition Date 5-7-81

Type of Source Vaporizing Pot /Truck

Test Number E050781

Sample ID Number KEA-BCL-PFb-E050781

Sample Description Particulate filter blank.

Original Sample Volume or Mass 0.6440g

Analyst Responsible R. L. Barbour

Date Analyzed 7-10-81

Time

Calculations and Report Reviewed By R. J. Jakobsen

Report Date 7-31-81

Column Flow Rate

Column Temperature

Observations No liquid chromatography performed.

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	--	1.20	1.20	0.037
Taken for LC[2]				
Recovered[3]				

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/ (m^3, L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-7-81

Type of Source Vaporizing Pot /Truck

Test Number E050781 **Sample ID Number** KEA-BCL-DFb-E050781

Sample Description Dilution filter blank.

Original Sample Volume or Mass 10.81g

Analyst Responsible R. L. Barbour **Date Analyzed** 7-10-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Column Flow Rate **Column Temperature**

Observations No liquid chromatography performed.

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	0.50	6.16	6.66	0.083
Taken for LC[2]				
Recovered[3]				

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/(m^3,L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-7-81

Type of Source Vaporizing Pot /Truck

Test Number E052081 **Sample ID Number** KEA-BCL-MMB-E050781

Sample Description CH_2Cl_2/Methanol blank

Original Sample Volume or Mass 382ml

Analyst Responsible R. L. Barbour **Date Analyzed** 7-10-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Column Flow Rate **Column Temperature**

Observations No liquid chromatography performed.

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	--	0.42	0.42	0.013
Taken for LC[2]				
Recovered[3]				

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/ (m^3, L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-7-81

Type of Source Vaporizing Pot /Truck

Test Number E050781 **Sample ID Number** KEA-BCL-PFa-E050781

Sample Description Particulate filter.

Original Sample Volume or Mass 0.7263g

Analyst Responsible R. L. Barbour **Date Analyzed** 7-10-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Column Flow Rate **Column Temperature**

Observations No liquid chromatography performed.

	TCD mg	GRAV mg	TCD + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	--	0.80	0.80	0.025
Taken for LC[2]				
Recovered[3]				

Fraction	TCD in mg				GRAV in mg				TCD + GRAV Total mg	Concentration mg/ (m^3, L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

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LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5/7/81

Type of Source Vaporizing Pot/Truck

Test Number E050781 **Sample ID Number** KEA-BCL-DF13/14-E050781

Sample Description Dilution filters #13 & 14

Original Sample Volume or Mass 23.72 g

Analyst Responsible R. L. Barbour **Date Analyzed** 7/25/81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7/31/81

Column Flow Rate 1 ml/min **Column Temperature** 22°C

Observations

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	3.09	89.150	92.24	1.15
Taken for LC[2]	1.89	54.60	56.49	-
Recovered[3]	0.73	24.15	24.88	-

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration[5] mg/m^3
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1	0.2	0.1	0.1	0.163	8.157	0.045	8.11	13.22	30.30	0.38
2	0.4	0.03	0.37	0.603	1.509	0.036	1.47	2.40	7.00	0.09
3	0.2	0.02	0.18	0.293	1.653	0.024	1.63	2.66	6.76	0.08
4	0.05	0.14	-	-	1.374	0.024	1.35	2.20	4.97	0.06
5	0.07	0.03	0.04	0.065	0.915	0.021	0.89	1.46	3.46	0.04
6	0.08	0.04	0.04	0.065	9.777	0.009	9.77	15.92	36.15	0.45
7	0.05	0.08	-	-	0.939	0.015	0.92	1.51	3.40	0.04
Sum	1.05	0.44	0.73	1.189	24.324	0.174	24.15	39.37	92.04	1.14

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. These values were normalized.

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP

Sample Acquisition Date 5-7-81

Type of Source Vaporizing Pot /Truck

Test Number E050781

Sample ID Number KEA-BCL-CD/0-E050781

Sample Description Neat condensate

Original Sample Volume or Mass 1000ml

Analyst Responsible R. L. Barbour

Date Analyzed 7-10-81

Time

Calculations and Report Reviewed By R. J. Jakobsen

Report Date 7-31-81

Column Flow Rate

Column Temperature

Observations No liquid chromatography performed.

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	0.9	2.03	2.93	0.091
Taken for LC[2]				
Recovered[3]				

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/(m^3, L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

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LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP Sample Acquisition Date 5-7-81

Type of Source Vaporizing Pot /Truck

Test Number E050781 Sample ID Number KEA-BCL-BA-E050781

Sample Description Bottom ash

Original Sample Volume or Mass 138.6g

Analyst Responsible R. L. Barbour Date Analyzed 7-10-81 Time

Calculations and Report Reviewed By R. J. Jakobsen Report Date 7-31-81

Column Flow Rate Column Temperature

Observations No liquid chromatography performed.

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/kg
Total Sample[1]	1.2	7.30	8.50	61.33
Taken for LC[2]				
Recovered[3]				

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/ (m^3, L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5/20/81

Type of Source Vaporizing pot/automotive

Test Number E052081 **Sample ID Number** KEA-BCL-XR/MR/E052081

Sample Description XAD-2 and module rinse

Original Sample Volume or Mass ~135 g

Analyst Responsible R. L. Barbour **Date Analyzed** 7/25/81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7/31/81

Column Flow Rate 1 ml/min **Column Temperature** 22°C

Observations

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	8.1	24.58	32.68	1.09
Taken for LC[2]	5.67	17.206	22.876	-
Recovered[3]	7.74	11.859	19.599	-

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration[5] mg/m^3
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1	1.0	0.1	0.9	1.287	1.05	0.05	1.01	1.44	3.02	0.10
2	0.4	0.03	0.37	0.529	0.066	0.04	0.03	0.043	0.45	0.02
3	0.06	0.02	0.04	0.057	0.978	0.02	0.95	1.364	2.02	0.07
4	0.04	0.14	-	-	0.831	0.02	0.81	1.154	1.67	0.06
5	0.1	0.03	0.07	0.100	0.768	0.02	0.75	1.068	1.62	0.05
6	6.4	0.04	6.36	9.095	7.248	0.01	7.24	10.35	21.65	0.72
7	0.03	0.08	-	-	1.092	0.02	1.08	1.540	2.23	0.07
Sum	8.03	0.44	7.74	11.068	12.033	0.17	11.86	16.96	32.66	1.09

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. These values were normalized.

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-20-81

Type of Source Vaporizing pot/automotive

Test Number E052081 **Sample ID Number** KEA-BCL-PFa5/6-E052081

Sample Description Particulate filters #5 and 6.

Original Sample Volume or Mass 1.3836g

Analyst Responsible R. L. Barbour **Date Analyzed** 7-10-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Column Flow Rate **Column Temperature**

Observations No liquid chromatography performed.

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	--	1.04	1.04	0.035
Taken for LC[2]				
Recovered[3]				

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/ (m^3, L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

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LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5/20/81

Type of Source Vaporizing pot/automotive

Test Number E052081 **Sample ID Number** KEA-BCL-DF16/17-E052081

Sample Description Dilution filters #16 and 17

Original Sample Volume or Mass 21.312 g

Analyst Responsible R. L. Barbour **Date Analyzed** 7/25/81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7/31/81

Column Flow Rate 1 ml/min **Column Temperature** 22°C

Observations

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/ (m^3, L, or kg)[5]
Total Sample[1]	2.63	107.394	110.024	0.88
Taken for LC[2]	1.61	65.78	67.39	-
Recovered[3]	0.06	30.641	30.751	-

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/ (m^3, L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1	0.03	0.1	-	-	8.94	0.045	8.89	14.50	31.17	0.25
2	0.03	0.03	-	-	0.264	0.036	0.23	0.37	0.80	0.01
3	0.08	0.02	0.06	0.098	3.291	0.024	3.27	5.33	14.08	0.11
4	0.03	0.14	-	-	3.534	0.024	3.50	5.71	12.27	0.10
5	0.03	0.03	-	-	1.86	0.021	1.84	3.00	6.45	0.05
6	0.02	0.04	-	-	10.029	0.009	10.02	16.33	35.12	0.28
7	0.03	0.08	-	-	2.907	0.015	2.89	4.71	10.14	0.08
Sum	0.25	0.44	0.06	0.098	30.825	0.174	30.64	49.95	110.03	0.88

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-20-81

Type of Source Vaporizing pot/automotive

Test Number E061881 **Sample ID Number** KEA-BCL-CD/O-E052081

Sample Description Neat condensate.

Original Sample Volume or Mass 1015ml

Analyst Responsible R. L. Barbour **Date Analyzed** 7-10-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Column Flow Rate **Column Temperature**

Observations No liquid chromatography performed.

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	0.90	2.41	3.31	0.110
Taken for LC[2]				
Recovered[3]				

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/(m^3, L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA; RTP **Sample Acquisition Date** May 20, 1981

Type of Source Vaporizing pot/automotive

Test Number E052081 **Sample ID Number** KEA-BCL-BA-E052081

Sample Description Bottom Ash

Original Sample Volume or Mass 297.0g

Analyst Responsible R. L. Barbour **Date Analyzed** July 25, 1981 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** July 31, 1981

Column Flow Rate 1 ml/min. **Column Temperature** 22°C

Observations

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/kg
Total Sample[1]	1.5	177.14	178.64	601.48
Taken for LC[2]	0.75	88.57	89.32	--
Recovered[3]	7.71	72.945	80.655	--

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration[5] mg/kg
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1	0.3	0.1	0.2	0.4	42.615	0.045	42.57	85.14	103.06	347.00
2	0.07	0.03	0.04	0.08	7.311	0.036	7.275	14.55	17.61	59.29
3	0.5	0.02	0.48	0.96	10.155	0.024	10.131	20.262	24.61	82.86
4	1.3	0.14	1.16	2.32	5.868	0.024	5.844	11.688	14.37	48.38
5	1.9	0.03	1.87	3.74	2.085	0.021	2.064	4.128	5.37	18.08
6	4.0	0.04	3.96	7.92	4.56	0.009	4.551	9.102	11.81	39.76
7	0.07	0.08	--	--	0.525	0.015	0.51	1.02	1.23	4.14
Sum	8.14	0.44	7.71	15.42	73.119	0.174	72.945	145.89	178.06	599.51

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. These values were normalized

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 6-18-81

Type of Source Air atomizing/automotive

Test Number E061881 **Sample ID Number** DREA-BCL-XR/MR-E061881

Sample Description XAD-2 and CH_2Cl_2 organic module rinse

Original Sample Volume or Mass 135g

Analyst Responsible R. L. Barbour **Date Analyzed** 7-10-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Column Flow Rate **Column Temperature**

Observations No liquid chromatography performed.

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	6.00	8.98	14.98	0.973
Taken for LC[2]				
Recovered[3]				

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/ (m^3, L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 6-18-81

Type of Source Air atomizing/automotive

Test Number E061881 **Sample ID Number** DREA-BCL-CD/0-E061881

Sample Description Neat condensate

Original Sample Volume or Mass 520ml

Analyst Responsible R. L. Barbour **Date Analyzed** 7-10-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Column Flow Rate **Column Temperature**

Observations No liquid chromatography performed.

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	0.60	0.47	1.07	0.069
Taken for LC[2]				
Recovered[3]				

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/(m^3,L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 6/18/81

Type of Source Air atomizinq/automotive

Test Number E061881 **Sample ID Number** DREA-BCL-DF18/29-E061881

Sample Description Dilution filters #18-29

Original Sample Volume or Mass 116.8 g

Analyst Responsible R. L. Barbour **Date Analyzed** 7/25/81 **.Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7/31/81

Column Flow Rate 1 ml/min. **Column Temperature** 22°C

Observations

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m³
Total Sample[1]	1.14	86.25	87.39	1.13
Taken for LC[2]	0.80	60.38	61.18	-
Recovered[3]	10.74	57.132	67.872	-

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/m³
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1	0.07	0.1	-	-	17.409	0.045	17.36	24.83	26.32	0.34
2	0.04	0.03	0.01	0.014	1.185	0.036	1.15	1.64	1.74	0.02
3	0.5	0.02	0.48	0.686	3.735	0.024	3.71	5.31	5.68	0.07
4	0.1	0.14	-	-	3.885	0.024	3.86	5.52	5.85	0.08
5	1.8	0.03	1.77	2.531	2.553	0.021	2.53	3.62	4.02	0.05
6	4.1	0.04	4.06	5.806	27.15	0.009	27.14	38.81	41.55	0.54
7	4.5	0.08	4.42	6.321	1.389	0.015	1.37	1.97	2.52	0.03
Sum	11.11	0.44	10.74	15.358	57.306	0.174	57.13	81.7	87.68	1.14

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. These values were normalized.

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 6-18-81

Type of Source Air atomizing/automotive

Test Number E061881 **Sample ID Number** DREA-BCL-PFa7/17-E061881

Sample Description Particulate filters #7 through 17.

Original Sample Volume or Mass

Analyst Responsible R. L. Barbour **Date Analyzed** 7-10-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Column Flow Rate **Column Temperature**

Observations No liquid chromatography performed.

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	--	0.61	0.61	0.040
Taken for LC[2]				
Recovered[3]				

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/ (m^3, L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

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LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA; RTP **Sample Acquisition Date** 11/81

Type of Source Air atomizing/automotive

Test Number E061881 **Sample ID Number** DREA-BCL-1C/3C/10C-E061881

Sample Description 1 μm, 3 μm and 10 μm cyclone catch

Original Sample Volume or Mass 3.0484 g

Analyst Responsible R. L. Barbour **Date Analyzed** 12/81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 1/12/82

Column Flow Rate **Column Temperature**

Observations No liquid chromatography performed

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/ (m³, L, or kg)⁵
Total Sample¹	-	0.44	0.44	0.03
Taken for LC²				
Recovered³				

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/ (m³, L, or kg)⁵
	Found in Fraction	Blank	Corrected	Total⁴	Found in Fraction	Blank	Corrected	Total⁴		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 6/25/81

Type of Source Air atomizing/truck

Test Number E062581 **Sample ID Number** DREA-BCL-XR/MR-E062581

Sample Description XAD-2 and module rinse

Original Sample Volume or Mass ∿135 g

Analyst Responsible R. L. Barbour **Date Analyzed** 7/25/81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7/31/81

Column Flow Rate 1 ml/min. **Column Temperature** 22°C

Observations

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	14.0	21.7	35.7	1.23
Taken for LC[2]	11.2	17.36	28.56	-
Recovered[3]	13.21	11.382	24.592	-

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration[5] mg/m^3
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1	0.4	0.1	0.3	0.375	1.155	0.045	1.11	1.39	2.44	0.08
2	0.05	0.03	0.03	0.025	0.009	0.036	-	-	0.02	0.001
3	0.4	0.02	0.38	0.475	1.248	0.024	1.22	1.53	2.74	0.09
4	1.7	0.14	1.56	1.95	1.257	0.024	1.23	1.54	4.02	0.14
5	1.8	0.03	1.77	2.213	0.759	0.021	0.74	0.92	3.29	0.11
6	4.5	0.04	4.46	5.575	6.366	0.009	6.36	7.95	16.90	0.58
7	4.8	0.08	4.72	5.9	0.735	0.015	0.72	0.9	6.40	0.22
Sum	13.65	0.44	13.21	16.513	11.529	0.174	11.38	14.23	35.81	1.221

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. These values were normalized.

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 6-25-81

Type of Source Air atomizing/truck

Test Number E062581 **Sample ID Number** DREA-BCL-CD/0-E062581

Sample Description Neat condensate

Original Sample Volume or Mass 1645ml

Analyst Responsible R. L. Barbour **Date Analyzed** 7-10-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Column Flow Rate **Column Temperature**

Observations No liquid chromatography performed.

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	1.00	2.42	3.42	0.118
Taken for LC[2]				
Recovered[3]				

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/ (m^3, L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 6/25/81

Type of Source Air atomizing/truck

Test Number E062581 **Sample ID Number** DREA-BCL-DF31/42-E062581

Sample Description Dilution filters #31-42

Original Sample Volume or Mass 148.6 g

Analyst Responsible R. L. Barbour **Date Analyzed** 7/25/81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7/31/81

Column Flow Rate 1ml/min. **Column Temperature** 22°C

Observations

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	2.29	114.72	117.01	1.00
Taken for LC[2]	1.6	80.304	81.904	-
Recovered[3]	12.06	57.504	69.564	-

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration[5] mg/m^3
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1	0.5	0.1	0.4	0.572	18.411	0.045	18.37	26.26	36.84	0.32
2	0.1	0.03	0.07	0.100	1.245	0.036	1.21	1.73	2.43	0.02
3	0.5	0.02	0.48	0.686	3.423	0.024	3.40	4.86	6.90	0.06
4	1.7	0.14	1.56	2.231	4.392	0.024	4.37	6.25	9.03	0.08
5	2.0	0.03	1.97	2.817	2.367	0.021	2.35	3.36	5.07	0.04
6	4.5	0.04	4.46	6.378	27.006	0.009	27.00	38.61	54.88	0.47
7	3.2	0.08	3.12	4.462	0.834	0.015	0.82	1.17	2.22	0.02
Sum	12.5	0.44	12.06	17.246	57.678	0.174	57.50	82.23	117.37	1.01

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. These values were normalized.

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 6-25-81

Type of Source Air atomizing/truck

Test Number E062581 **Sample ID Number** DREA-BCL-PFa1/12/1c-E062581

Sample Description Particulate filters #1 through 12 and 1μm cyclone catch

Original Sample Volume or Mass 12.3717g

Analyst Responsible R. L. Barbour **Date Analyzed** 7-10-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Column Flow Rate **Column Temperature**

Observations No liquid chromatography performed.

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	--	0.87	0.87	0.030
Taken for LC[2]				
Recovered[3]				

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/ (m^3, L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

LC ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 6-25-81

Type of Source Air Atomizing/Truck

Test Number E062581 **Sample ID Number** DREA-BCL-3c/10c-E062581

Sample Description 3μm and 10μm cyclone catch

Original Sample Volume or Mass 3.1361g

Analyst Responsible R. L. Barbour **Date Analyzed** 7-10-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Column Flow Rate **Column Temperature**

Observations No liquid chromatography performed.

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/m^3
Total Sample[1]	0.07	0.46	0.53	0.018
Taken for LC[2]				
Recovered[3]				

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/ (m^3, L, or kg)[5]
	Found in Fraction	Blank	Corrected	Total[4]	Found in Fraction	Blank	Corrected	Total[4]		
1										
2										
3										
4										
5										
6										
7										
Sum										

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample
5. Supply values for both sample size and concentration

APPENDIX A

INFRARED SPECTROSCOPY RESULTS

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site

Sample Acquisition Date

Type of Source

Test Number

Sample ID Number

Sample Description Liquid Chromatography Blank

Responsible Analyst Rachael L. Barbour

Date Analyzed

Calculations and Report Reviewed By Robert J. Jakobsen

Report Date 7-31-81

Instrument Digilab FTS-10

Sample Cell Type

Utilized Max/Min Signal Intensity Values

Observations

Fraction 1 - Nothing Detected
Fraction 2 - Nothing Detected
Fraction 3 - Some Aliphatic Hydrocarbon
Fraction 4 - Nothing Detected
Fraction 5 - Nothing Detected
Fraction 6 - Nothing Detected
Fraction 7 - Nothing Detected

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP

Sample Acquisition Date 5-7-81

Type of Source Vaporizing pot/truck

Test Number E050781

Sample ID Number KEA-BCL-XR-E050781/
KEA-BCL-MR-E050781

Sample Description XAD-2 and CH_2Cl_2 Organic Module Rinse

Responsible Analyst Rachael L. Barbour

Date Analyzed 6-10-81

Calculations and Report Reviewed By Robert J. Jakobsen

Report Date 7-31-81

Instrument Digilab FTS-10

Sample Cell Type Film on KBr Plate

Utilized Max/Min Signal Intensity Values

Observations

Large amounts of Aliphatic Hydrocarbon and carboxylic acid. Also small amounts of ester and anhydride. Possible alkyl ether and some aromaticity.

IR REPORT

SAMPLE: KEA-BCL-XR-E050781/KEA-BCL-MR-E050781

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2956	M	Aliphatic CH stretch	
2927	S	Aliphatic CH stretch	
2854	M	Aliphatic CH stretch	
1849	W	C=O stretch	
1776	W	C=O stretch	
1705	S	C=O stretch	
1602	W	C=C stretch	
1454	M	CH_2 bend	
1415	M	CH_2 bend	
1377	M	CH_3 bend	
1317	M	CH_3 bend	
1284	M	C-O stretch	
1261	M	C-O stretch	
1176	M	C-O stretch	
1112	M	C-O stretch	
1072	M	C-O stretch	
1026	W	C-O stretch	
800	W	Aromatic substitution	
713	M	Aromatic substitution	

IR REPORT

SAMPLE: KEA-BCL-XR/MR-E050781 Fraction 1

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2954	M	Aliphatic CH Stretch	
2920	S	Aliphatic CH Stretch	
2850	S	Aliphatic CH Stretch	
1462	M	CH_2 bend	
1382	M	CH_3 bend	

Only aliphatic hydrocarbon. Not much sample present.

IR REPORT

SAMPLE: KEA-BCL-XR/MR-E050781 Fraction 2

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2956	S	Aliphatic CH Stretch	
2926	S	Aliphatic CH Stretch	
2868	S	Aliphatic CH Stretch	
2854	S	Aliphatic CH Stretch	
1734	S	C=O Stretch	
1718	S	C=O Stretch	
1458	S	CH_2 bend	
1419	S	CH_2 bend	
1384	S	CH_3 bend	
1259	S	C-O Stretch	
1035	S	C-O Stretch	
804	S	Aromatic Substitution	

Some aliphatic hydrocarbon with carbonyl structure which appears to be an ester and ketone. Also an alcohol appears to be present. Small amount of aromaticity. Not much sample was present.

IR REPORT

SAMPLE: KEA-BCL-XR/MR-E050781 Fraction 3

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3005	W	Aromatic CH Stretch	
2954	M	Aliphatic CH Stretch	
2922	S	Aliphatic CH Stretch	
2852	S	Aliphatic CH Stretch	
1737	M	C=O Stretch	
1463	M	CH_2 bend	
1377	W	CH_3 bend	
1259	W	C-O Stretch	
1172	W	C-O Stretch	
800	W	Aromatic Substitution	

Large amounts of aliphatic hydrocarbon. A carbonyl compound, probably ester, and some aromaticity.

IR REPORT

SAMPLE: KEA-BCL-XR/MR-E050781 Fraction 4

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3028	M	Aromatic CH Stretch	
2926	S	Aliphatic CH Stretch	Shoulder
2854	S	Aliphatic CH Stretch	
1737	S	C=0 Stretch	
1458	S	CH_2 bend	
1377	M	CH_3 bend	
1269	S	C-0 Stretch	
1157	S	C-0 Stretch	
1114	S	C-0 Stretch	
802	S	Aromatic Substitution	
709	S	Aromatic Substitution	

Aliphatic hydrocarbon with a carbonyl compound, probably an ester. Small amounts of aromaticity.

IR REPORT

SAMPLE: KEA-BCL-XR/MR-E050781 Fraction 5

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2926	S	Aliphatic CH Stretch	Shoulder
1743	M	C=O Stretch	
1720	W	C=O Stretch	
1608	W	C=C Stretch	
1381	M	CH_3 bend	
1263	M	C-O Stretch	
1153	S	C-O Stretch	
1095	M	C-O Stretch	
798	M	Aromatic Substitution	

Some aliphatic hydrocarbon present with some carbonyl, probably ester, ketone, and acid. Also a significant amount of what appears to be an alkyl ether. Small amount of aromaticity. Very little sample present.

IR REPORT

SAMPLE: KEA-BCL-XR/MR-E050781 Fraction 6

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2926	S	Aliphatic CH Stretch	Shoulder
2854	M	Aliphatic CH Stretch	
1780	W	C=O Stretch	
1710	M	C=O Stretch, shoulder	
1600	W	C=C Stretch	
1462	M	CH$_2$ bend	
1413	M	CH$_2$ bend	
1377	M	CH$_3$ bend	
1276	M	C-O Stretch	
1114	M	C-O Stretch	
1093	M	C-O Stretch	
1018	W	C-O Stretch	
758	W	Aromatic Substitution	
711	W	Aromatic Substitution	

Large amounts of aliphatic hydrocarbon. Some carbonyl structure which appears to be ester, acid and lactone. Small amount of olefin and aromaticity.

IR REPORT

SAMPLE: KEA-BCL-XR/MR-E050781 Fraction 7

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2926	S	Aliphatic CH Stretch	Shoulder
2854	M	Aliphatic CH Stretch	
1732	M	C=O Stretch	Shoulder
1589	M	C=C Stretch	
1556	M	C=C Stretch	
1452	M	CH_2 bend	
1411	M	CH_2 bend	
1284	M	C-O Stretch	
1118	M	C-O Stretch	
1099	W	C-O Stretch	
754	W	Aromatic Substitution	
711	W	Aromatic Substitution	

Large amount of aliphatic hydrocarbon. Some carbonyl structure, probably ester with acid and ketone. Large amounts of what appears to be acid salt.

IR ANALYSIS REPORT

Contractor BatteHe Columbus Laboratories

Sample Site EPA;RTP

Sample Acquisition Date 5-7-81

Type of Source Vaporizing pot/truck

Test Number E050781

Sample ID Number KEA-BCL-XRB-E050781/
KEA-BCL-MCB-E050781

Sample Description XAD-2 Blank and CH_2Cl_2 Blank

Responsible Analyst Rachael L. Barbour

Date Analyzed 6-10-81

Calculations and Report Reviewed By Robert J. Jakobsen

Report Date 7-31-81

Instrument Digilab FTS-10

Sample Cell Type Film on KBr Plate

Utilized Max/Min Signal Intensity Values

Observations

Mostly aliphatic hydrocarbon with some carbonyl, probably ester and ketone. Very small amounts of aromaticity.

IR REPORT

SAMPLE: KEA-BCL-XRB-E050781/KEA-BCL-MCB-E050781

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2954	M	Aliphatic CH stretch	
2926	S	Aliphatic CH stretch	
2854	S	Aliphatic CH stretch	
1741	M	C=O stretch	
1728	M	C=O stretch	
1710	M	C=O stretch	
1602	M	C=C stretch	
1585	M	C=C stretch	
1463	M	CH_2 bend	
1452	M	CH_2 bend	
1411	M	CH_2 bend	
1377	M	CH_3 bend	
1265	M	C-O stretch	
1163	M	C-O stretch	
1112	M	C-O stretch	
1074	M	C-O stretch	
1028	M	C-O stretch	
798	M	Aromatic substitution	
700	M	Aromatic substitution	

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-7-81

Type of Source Vaporizing pot/truck

Test Number E050781 **Sample ID Number** KEA-BCL-PFb-E050781

Sample Description Particulate filter blank

Responsible Analyst Rachael L. Barbour **Date Analyzed** 6-10-81

Calculations and Report Reviewed By Robert J. Jakobsen **Report Date** 7-31-81

Instrument Digilab FTS-10 **Sample Cell Type** Film on KBr Plate

Utilized Max/Min Signal Intensity Values

Observations

Mostly aliphatic hydrocarbon with small amounts of ester. Possible aliphatic ether present with some aromaticity.

IR REPORT

SAMPLE: KEA-BCL-PFb-E050781

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2953	M	Aliphatic CH stretch	
2926	S	Aliphatic CH stretch	
2856	M	Aliphatic CH stretch	
1735	W	C=O stretch	
1614	W	C=C stretch	
1512	W	C=C stretch	
1462	W	CH_2 bend	
1382	M	CH_3 bend	
1288	W	C-O stretch	
1257	W	C-O stretch	
1247	W	C-O stretch	
1151	M	C-O stretch	
1114	M	C-O stretch	
1095	M	C-O stretch	
1039	W	C-O stretch	
827	W	Aromatic substitution	
800	W	Aromatic substitution	
700	W	Aromatic substitution	

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-7-81

Type of Source Vaporizing pot/truck

Test Number E050781 **Sample ID Number** KEA-BCL-DFb-E050781

Sample Description Dilution filter blank

Responsible Analyst Rachael L. Barbour **Date Analyzed** 6-10-81

Calculations and Report Reviewed By Robert J. Jakobsen **Report Date** 7-31-81

Instrument Digilab FTS-10 **Sample Cell Type** Film on KBr Plate

Utilized Max/Min Signal Intensity Values

Observations

Aliphatic hydrocarbon with some carbonyl compounds, probably ester and ketone. There is also a cyclic ether present and small amounts of aromaticity.

IR REPORT

SAMPLE: KEA-BCL-DFb-E050781

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2953	S	Aliphatic CH stretch	
2926	S	Aliphatic CH stretch	
2870	M	Aliphatic CH stretch	
2858	S	Aliphatic CH stretch	
1735	W	C=O stretch	
1608	W	C=C stretch	
1512	M	C=C stretch	
1462	M	CH_2 bend	
1379	W	CH_3 bend	
1365	M	CH_3 bend	
1292	M	C-O stretch	
1246	M	C-O stretch	
1186	M	C-O stretch	
1126	M	C-O stretch	
1068	M	C-O stretch	
925	W	Aromatic substitution	
829	M	Aromatic substitution	

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-7-81

Type of Source Vaporizing pot/truck

Test Number E050781 **Sample ID Number** KEA-BCL-MMB-E050781

Sample Description CH_2Cl_2/Methanol Blank

Responsible Analyst Rachael L. Barbour **Date Analyzed** 6-10-81

Calculations and Report Reviewed By Robert J. Jakobsen **Report Date** 7-31-81

Instrument Digilab FTS-10 **Sample Cell Type** Film on KBr Plate

Utilized Max/Min Signal Intensity Values

Observations

Large amounts of carbonyl, mostly ester. Small amount of aliphatic Hydrocarbon and aromaticity.

IR REPORT

SAMPLE: KEA-BCL-MMB-E050781

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2972	M	Aliphatic CH Stretch	
2924	M	Aliphatic CH Stretch	
2854	M	Aliphatic CH Stretch	
1734	S	C=O Stretch	
1647	M	C=C Stretch	
1635	M	C=C Stretch	
1427	W	CH_2 bend	
1371	M	CH_3 bend	
1234	S	C-O Stretch	
1122	M	C-O Stretch	
1020	M	C-O Stretch	
945	M	Aromatic Substitution	

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-7-81

Type of Source Vaporizing pot/truck

Test Number E050781 **Sample ID Number** KEA-BCL-PFa-E050781

Sample Description Particulate filter

Responsible Analyst Rachael L. Barbour **Date Analyzed** 6-10-81

Calculations and Report Reviewed By Robert J. Jakobsen **Report Date** 7-31-81

Instrument Digilab FTS-10 **Sample Cell Type** Film on KBr Plate

Utilized Max/Min Signal Intensity Values

Observations

Mostly aliphatic hydrocarbon, with some carbonyl structure, probably ester, aldehyde, and ketone. Very small amount of aromaticity.

IR REPORT

SAMPLE: KEA-BCL-PFa-E050781

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2924	S	Aliphatic CH Stretch	Shoulder
2852	M	Aliphatic CH Stretch	
1739	M	C=O Stretch	
1728	M	C=O Stretch	
1710	W	C=O Stretch	
1627	W	C=C Stretch	
1598	W	C=C Stretch	
1463	W	CH_2 bend	
1381	W	CH_3 bend	
1246	W	C-O Stretch	
1143	W	C-O Stretch	

IR ANALYSIS REPORT

Contractor	Battelle Columbus Laboratories		
Sample Site	EPA;RTP	**Sample Acquisition Date**	5-7-81
Type of Source	Vaporizing pot/truck		
Test Number	E050781	**Sample ID Number**	KEA-BCL-DF13-E050781/ KEA-BCL-DF14-E050781
Sample Description	Dilution filters #13 and 14, combined		
Responsible Analyst	Rachael L. Barbour	**Date Analyzed**	6-10-81
Calculations and Report Reviewed By	Robert J. Jakobsen	**Report Date**	7-31-81
Instrument	Digilab FTS-10	**Sample Cell Type**	Film on KBr Plate
Utilized Max/Min Signal Intensity Values			

Observations

Large amounts of aliphatic hydrocarbon. Also significant amounts of acid and ester are present. There is possibly some aliphatic ether and small amounts of aromaticity.

IR REPORT

SAMPLE: KEA-BCL-DF13-E050781/KEA-BCL-DF14-E050781

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2968	S	Aliphatic CH stretch	
2939	S	Aliphatic CH stretch	
2910	M	Aliphatic CH stretch	
2870	S	Aliphatic CH stretch	
1770	M	C=0 stretch	
1726	M	C=0 stretch	
1714	M	C=0 stretch	
1460	M	CH_2 bend	
1377	M	CH_3 bend	
1244	M	C-0 stretch	
1172	M	C-0 stretch	
1058	M	C-0 stretch	
1028	M	C-0 stretch	
947	M	Aromatic substitution	
883	M	Aromatic substitution	
852	M	Aromatic substitution	
700	M	Aromatic substitution	

IR REPORT

SAMPLE: KEA-BCL-DF13/14-E050781 Fraction 1

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2954	S	Aliphatic CH Stretch	
2924	S	Aliphatic CH Stretch	
2854	S	Aliphatic CH Stretch	
1462	M	CH_2 bend	
1377	W	CH_3 bend	

Large amounts of aliphatic hydrocarbon.

SAMPLE: KEA-BCL-DF13/14-E050781 Fraction 2

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3084	W	Aromatic CH Stretch	
3057	W	Aromatic CH Stretch	
3020	M	Aromatic CH Stretch	
2956	S	Aliphatic CH Stretch	
2926	S	Aliphatic CH Stretch	
2868	M	Aliphatic CH Stretch	
1600	W	C=C Stretch	
1494	M	CH_2 bend	
1456	M	CH_2 bend	
1377	M	CH_3 bend	
813	M	Aromatic Substitution	
759	M	Aromatic Substitution	
700	M	Aromatic Substitution	

Mostly aliphatic hydrocarbon with small amount of olefin and aromaticity.

IR REPORT

SAMPLE: KEA-BCL-DF13/14-E050781 Fraction 3

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2956	S	Aliphatic CH Stretch	
2926	S	Aliphatic CH Stretch	
2854	M	Aliphatic CH Stretch	
1768	W	C=O Stretch	
1735	M	C=O Stretch	
1600	W	C=C Stretch	
1456	M	CH_2 bend	
1377	M	CH_3 bend	
1174	M	C-O Stretch	
756	M	Aromatic Substitution	
700	M	Aromatic Substitution	

Mostly aliphatic hydrocarbon with a small amount of carbonyl probably ester and ketone. Small amount of olefin and aromaticity.

IR REPORT

SAMPLE: KEA-BCL-DF13/14-E050781 Fraction 4

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2956	S	Aliphatic CH Stretch	
2927	S	Aliphatic CH Stretch	
2858	S	Aliphatic CH Stretch	
1728	M	C=O Stretch	
1600	M	C=C Stretch	
1458	M	CH_2 bend	
1379	M	CH_3 bend	
1273	M	C-O Stretch	Shoulder
1122	M	C-O Stretch	
1072	M	C-O Stretch	
902	M	Aromatic Substitution	
862	M	Aromatic Substitution	
835	M	Aromatic Substitution	
744	M	Aromatic Substitution	
700	M	Aromatic Substitution	

Large amounts of aliphatic hydrocarbon and a carbonyl structure that appears to be an ester. Small amount of ether and some aromatic structure.

IR REPORT

SAMPLE: KEA-BCL-DF13/14-E050781 Fraction 5

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2956	S	Aliphatic CH Stretch	
2927	S	Aliphatic CH Stretch	
2856	M	Aliphatic CH Stretch	
1772	W	C=0 Stretch	
1732	M	C=0 Stretch	
1680	W	C=C Stretch	
1600	W	C=C Stretch	
1462	W	CH_2 bend	
1379	W	CH_3 bend	
1278	W	C-0 Stretch	
1122	W	C-0 Stretch	
1072	W	C-0 Stretch	
761	W	Aromatic Substitution	
746	W	Aromatic Substitution	
702	W	Aromatic Substitution	

Large amount of aliphatic hydrocarbon. Some carbonyl, probably ester with lactone. Small amount of what appears to be ether, and a small amount of aromaticity.

IR REPORT

SAMPLE: KEA-BCL-DF13/14-E050781 Fraction 6

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2954	S	Aliphatic CH Stretch	
2856	S	Aliphatic CH Stretch	
1735	M	C=O Stretch	Shoulder
1710	M	C=O Stretch	
1606	W	C=C Stretch	
1512	W	C=C Stretch	
1458	M	CH$_2$ bend	
1379	M	CH$_3$ bend	
;365	W	CH$_3$ bend	
;242	S	C-O Stretch	Shoulder
1222	S	C-O Stretch	
2222	M	C-O Stretch	
962	M	Aromatic Substitution	
829	W	Aromatic Substitution	

Very large amount of aliphatic hydrocarbon. Significant amount of carbonyl that appears to be ester, ketone, and lactone. Probable ether present, and small amount of aromaticity.

IR REPORT

SAMPLE: KEA-BCL-DF13/14-E050781 Fraction 7

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2926	S	Aliphatic CH Stretch	Shoulder
2854	M	Aliphatic CH Stretch	
1734	M	C=0 Stretch	Shoulder
1716	M	C=0 Stretch	
1575	M	C=C Stretch	
1558	M	C=C Stretch	
1458	M	CH_2 bend	
1379	M	CH_3 bend	
1246	M	C-0 Stretch	
952	M	Aromatic Substitution	

Some aliphatic hydrocarbon with some carbonyl which appears to be ester with ketone and lactone. Small amount of aromaticity. Not much sample present.

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-7-81

Type of Source Vaporizing pot/truck

Test Number E050781 **Sample ID Number** KEA-BCL-CD/O-E050781

Sample Description Neat condensate

Responsible Analyst R. L. Barbour **Date Analyzed** 6-10-81

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Instrument Digilab FTS-10 **Sample Cell Type** Film on KBr plate

Utilized Max/Min Signal Intensity Values

Observations

Aliphatic hydrocarbon with significant amounts of carbonyl, probably a mixture of ester, aldehyde and alkyl ketone. Very small amount of aromaticity. Not much sample present.

IR REPORT

SAMPLE: KEA-BCL-CD/O-E050781

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2954	M	Aliphatic CH stretch	
2922	S	Aliphatic CH stretch	
2852	M	Aliphatic CH stretch	
1766	W	C=O stretch	
1722	S	C=O stretch	
1708	S	C=O stretch	
1693	S	C=C stretch	
1600	M	C=C stretch	
1463	M	CH_2 bend	
1452	M	CH_2 bend	
1409	M	CH_3 bend	
1379	M	CH_3 bend	
1355	M	CH_3 bend	
1284	M	C-O stretch	
1230	M	C-O stretch	
1190	M	C-O stretch	
1166	M	C-O stretch	
1122	M	C-O stretch	
1012	M	C-O stretch	
835	W	Aromatic substitution	
775	W	Aromatic substitution	
723	W	Aromatic substitution	

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-7-81

Type of Source Vaporizing pot/truck

Test Number E050781 **Sample ID Number** KEA-BCL-BA-E050781

Sample Description Bottom Ash

Responsible Analyst Rachael L. Barbour **Date Analyzed** 6-10-81

Calculations and Report Reviewed By Robert J. Jakobsen **Report Date** 7-31-81

Instrument Digilab FTS-10 **Sample Cell Type** Film on KBr Plate

Utilized Max/Min Signal Intensity Values

Observations

Mostly Aliphatic Hydrocarbon. Some carbonyl present, probably an ester with a ketone and lactone. Small amounts of aromaticity.

IR REPORT

SAMPLE: KEA-BCL-BA-E050781

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2953	M	Aliphatic CH Stretch	
2922	S	Aliphatic CH Stretch	
2852	M	Aliphatic CH Stretch	
1772	W	C=O Stretch	
1735	W	C=O Stretch	
1708	W	C=O Stretch	
1602	W	C=C Stretch	
1462	W	CH_2 bend	
1377	W	CH_3 bend	
1261	W	C-O Stretch	

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-20-81

Type of Source Vaporizing pot/automotive

Test Number E0502081 **Sample ID Number** KEA-BCL-MR/XR-E052081

Sample Description XAD-2 and CH_2Cl_2 organic module rinse

Responsible Analyst Rachael L. Barbour **Date Analyzed** 6-10-81

Calculations and Report Reviewed By Robert J. Jakobsen **Report Date** 7-31-81

Instrument Digilab FTS-10 **Sample Cell Type** Film on KBr Plate

Utilized Max/Min Signal Intensity Values

Observations

Large amounts of aliphatic hydrocarbon. Also a large amount of what appears to be acid with possible anhydride. Some amount of aromaticity.

IR REPORT

SAMPLE: KEA-BCL-MR/XR-E052081

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3061	M	Aromatic CH Stretch	
2958	S	Aliphatic CH Stretch	
2927	S	Aliphatic CH Stretch	
2856	S	Aliphatic CH Stretch	
1724	S	C=O Stretch	
1602	M	C=C Stretch	
1456	M	CH_2 bend	
1365	M	CH_3 bend	
1338	M	CH_3 bend	
1261	S	C-O Stretch	
1157	M	C-O Stretch	
1095	S	C-O Stretch	
1026	M	C-O Stretch	
800	M	Aromatic Substitution	
761	M	Aromatic Substitution	
709	M	Aromatic Substitution	

IR REPORT

SAMPLE: KEA-BCL-MR/XR-E052081 Fraction 1

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2950	M	Aliphatic CH Stretch	
2924	S	Aliphatic CH Stretch	
2852	M	Aliphatic CH Stretch	
1463	W	CH_2 bend	
1377	W	CH_3 bend	

Some aliphatic hydrocarbon

IR REPORT

SAMPLE: KEA-BCL-MR/XR-E052081 Fraction 2

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2955	M	Aliphatic CH Stretch	
2926	S	Aliphatic CH Stretch	
1735	W	C=O Stretch	
1635	W	C=C Stretch	
1598	W	C=C Stretch	
1456	W	CH_2 bend	
1382	W	CH_3 bend	
1141	W	C-O Stretch	
1016	W	C-O Stretch	

Some aliphatic hydrocarbon with a carbonyl, possibly an ester, and some acid.

IR REPORT

SAMPLE: KEA-BCL-MR/XR-E052081 Fraction 3

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3057	W	Aromatic CH Stretch	
2926	S	Aliphatic CH Stretch	
2854	M	Aliphatic CH Stretch	
1730	W	C=O Stretch	
1627	W	C=C Stretch	
1452	M	CH_2 bend	
1379	W	CH_3 bend	
1261	W	C-O Stretch	
1193	W	C-O Stretch	
1093	W	C-O Stretch	
1029	W	C-O Stretch	
812	M	Aromatic Substitution	
777	W	Aromatic Substitution	
736	M	Aromatic Substitution	

Aliphatic hydrocarbon with some carbonyl structure, probably ester and ketone. Significant amount of aromaticity.

IR REPORT

SAMPLE: KEA-BCL-MR/XR-E052081 Fraction 4

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2956	M	Aliphatic CH Stretch	
2926	S	Aliphatic CH Stretch	
2854	M	Aliphatic CH Stretch	
1851	W	C=O Stretch	
1778	W	C=O Stretch	
1722	M	C=O Stretch	
1631	W	C=C Stretch	
1452	M	CH_2 bend	
1338	W	CH_3 bend	
1271	M	C-O Stretch	
1174	M	C-O Stretch	
1161	M	C-O Stretch	
1111	M	C-O Stretch	
800	W	Aromatic Substitution	
758	W	Aromatic Substitution	
740	W	Aromatic Substitution	
709	M	Aromatic Substitution	

Large amounts of aliphatic hydrocarbon with a carbonyl mixture of anhydride, ester, and ketone. Some aromaticity.

IR REPORT

SAMPLE: KEA-BCL-MR/XR-E052081 Fraction 5

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3066	M	Aromatic CH Stretch	
2958	M	Aliphatic CH Stretch	
2926	S	Aliphatic CH Stretch	
2854	S	Aliphatic CH Stretch	
1772	M	C=O Stretch	
1739	S	C=O Stretch	
1600	M	C=C Stretch	
1456	M	CH_2 bend	
1263	M	C-O Stretch	
1166	M	C-O Stretch	
1118	M	C-O Stretch	
1018	M	C-O Stretch	
800	M	Aromatic Substitution	
761	M	Aromatic Substitution	
709	M	Aromatic Substitution	

Aliphatic hydrocarbon with significant amount of carbonyl structure. Mostly ester with lactone and ketone. Some aromaticity.

SAMPLE: KEA-BCL-MR/XR-F052081 Fraction 6

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3327	W	OH Stretch	
3288	W	OH Stretch	
3062	W	Aromatic CH Stretch	
2958	M	Aliphatic CH Stretch	
2926	S	Aliphatic CH Stretch	
2854	M	Aliphatic CH Stretch	
1774	W	C=O Stretch	
1722	M	C=O Stretch	
1600	M	C=C Stretch	
1556	M	C=C Stretch	
1454	M	CH_2 bend	
1365	M	CH_3 bend	
1274	M	C-O Stretch	
1112	M	C-O Stretch	
1093	M	C-O Stretch	
761	W	Aromatic Substitution	
711	W	Aromatic Substitution	

Large amounts of aliphatic hydrocarbon with significant amounts of carbonyl, mostly acid with some ester. Also some acid salt. Small amount of aromaticity.

IR REPORT

SAMPLE: KEA-BCL-MR/XR-E052081 Fraction 7

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3062	W	Aromatic CH Stretch	
3030	W	Aliphatic CH Stretch	
2958	S	Aliphatic CH Stretch	
2927	S	Aliphatic CH Stretch	
2870	M	Aliphatic CH Stretch	
2858	M	Aliphatic CH Stretch	
1720	S	C=O Stretch	
1600	S	C=C Stretch	
1560	S	C=C Stretch	
1450	S	CH_3 bend	
1410	S	CH_3 bend	
1280	M	C-O Stretch	
1250	M	C-O Stretch	
1110	M	C-O Stretch	
1080	M	C-O Stretch	
940	W	Aromatic Substitution	
860	W	Aromatic Substitution	
720	W	Aromatic Substitution	

Mostly acid salt with some aliphatic hydrocarbon and small amounts of aromaticity.

IR ANALYSIS REPORT

Contractor	Battelle Columbus Laboratories		
Sample Site	EPA;RTP	**Sample Acquisition Date**	5-20-81
Type of Source	Vaporizing pot/automotive		
Test Number	E0502081	**Sample ID Number**	KEA-BCL-PFa5-E052081/ KEA-BCL-PFa6-E052081
Sample Description	Particulate filters # 5 and 6 combined		
Responsible Analyst	Rachael L. Barbour	**Date Analyzed**	6-10-81
Calculations and Report Reviewed By	Robert J. Jakobsen	**Report Date**	7-31-81
Instrument	Digilab FTS-10	**Sample Cell Type**	Film on KBr Plate
Utilized Max/Min Signal Intensity Values			

Observations

Mostly aliphatic hydrocarbon with some carbonyl structure, probably ester and ketone. Very small amounts of aromaticity. Not much sample present.

IR REPORT

SAMPLE: KEA-BCL-PFa5-E050781/KEA-BCL-PFa6-E050781

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2953	M	Aliphatic CH stretch	
2926	S	Aliphatic CH stretch	
2854	M	Aliphatic CH stretch	
1737	M	C=0 stretch	
1726	M	C=0 stretch	
1712	M	C=0 stretch	
1641	W	C=C stretch	
1627	W	C=C stretch	
1598	W	C=C stretch	
1462	W	CH_2 bend	
1379	W	CH_3 bend	
1276	W	C-0 stretch	
1163	W	C-0 stretch	
1116	W	C-0 stretch	
1028	W	C-0 stretch	
754	W	Aromatic substitution	

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-20-81

Type of Source Vaporizing pot/automotive

Test Number E0502081 **Sample ID Number** KEA-BCL-DF16/17-E052081

Sample Description Dilution filters 16 and 17 combined

Responsible Analyst Rachael L. Barbour **Date Analyzed** 6-10-81

Calculations and Report Reviewed By Robert J. Jakobsen **Report Date** 7-31-81

Instrument Digilab FTS-10 **Sample Cell Type** Film on KBr Plate

Utilized Max/Min Signal Intensity Values

Observations

Mostly Aliphatic hydrocarbon, with what appears to be a mixture of acid, ester, and anhydride. Also possibly some ether present.

IR REPORT

SAMPLE: KEA-BCL-DF16/17=E052081

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2929	S	Aliphatic CH Stretch	
2856	S	Aliphatic CH Stretch	
1730	M	C=0 Stretch	
1604	M	C=C Stretch	
1458	M	CH_2 bend	
1375	M	CH_3 bend	
1230	M	C-0 Stretch	
1170	M	C-0 Stretch	
1056	M	C-0 Stretch	
1035	M	C-0 Stretch	

IR REPORT

SAMPLE: KEA-BCL-DF16/17-E052081 Fraction 1

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2954	S	Aliphatic CH stretch	
2926	S	Aliphatic CH stretch	
1460	M	CH_2 bend	
1377	W	CH_3 bend	

Aliphatic hydrocarbon

IR REPORT

SAMPLE: KEA-BCL-DF16/17-E052081 Fraction 2

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2956	S	Aliphatic CH Stretch	
2926	S	Aliphatic CH Stretch	
2858	S	Aliphatic CH Stretch	
1741	M	C=O Stretch	
1703	M	C=O Stretch	
1460	M	CH_2 bend	
1382	M	CH_3 bend	
1120	M	C-O Stretch	
1082	M	C-O Stretch	

Some aliphatic hydrocarbon with a small amount of carbonyl, probably ester and ketone.

IR REPORT

SAMPLE: KEA-BCL-DF16/17-E052081 Fraction 3

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2956	S	Aliphatic CH Stretch	
2926	S	Aliphatic CH Stretch	
2860	M	Aliphatic CH Stretch	
1732	W	C=O Stretch	
1703	W	C=O Stretch	
1600	W	C=C Stretch	
1537	W	C=C Stretch	
1444	W	CH_2 bend	
1377	W	CH_3 bend	
1253	W	C-O Stretch	
1002	W	C-O Stretch	
968	W	Aromatic Substitution	
752	W	Aromatic Substitution	
700	W	Aromatic Substitution	

Aliphatic hydrocarbon with a small amount of carbonyl, probably ester and ketone. Small amount of olefin and what appears to be ether present.

SAMPLE: KEA-BCL-DF16/17-E052081 Fraction 4

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2926	S	Aliphatic CH Stretch	
2858	S	Aliphatic CH Stretch	
1730	M	C=0 Stretch	
1460	M	CH_2 bend	
1382	M	CH_3 bend	
1267	M	C-0 Stretch	
1120	M	C-0 Stretch	
1076	M	C-0 Stretch	

Aliphatic hydrocarbon with some carbonyl, probably ketone with acid. Small amount of aromaticity.

IR REPORT

SAMPLE: KEA-BCL-DF16/17-F052081 Fraction 5

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2956	S	Aliphatic CH Stretch	
2927	S	Aliphatic CH Stretch	
2856	M	Aliphatic CH Stretch	
1774	W	C=0 Stretch	
1730	M	C=0 Stretch	
1462	M	CH_2 bend	
1381	W	CH_3 bend	
1274	M	C-0 Stretch	
1161	M	C-0 Stretch	
1122	M	C-0 Stretch	
1072	M	C-0 Stretch	
744	W	Aromatic Substitution	

Aliphatic hydrocarbon with what appears to be ketone and ester. Some ether seems to be present. Small amount of aromaticity.

SAMPLE: KEA-BCL-DF16/17-E052081 Fraction 6

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3034	M	Aromatic CH Stretch	
2954	S	Aliphatic CH Stretch	
2927	S	Aliphatic CH Stretch	
2856	S	Aliphatic CH Stretch	
1734	M	C=O Stretch	Shoulder
1705	M	C=O Stretch	
1608	M		
1458	M	CH_2 bend	
1381	M	CH_3 bend	
1365	M	CH_3 bend	
1224	S	C-O Stretch	Broad
1107	S	C-O Stretch	
958	M	Aromatic Substitution	
935	M	Aromatic Substitution	
825	M	Aromatic Substitution	
727	M	Aromatic Substitution	

Some aliphatic hydrocarbon with significant amounts of carbonyl, mostly ketone, aldehyde and ester. Some ether also appears to be present. Small amount of aromaticity.

IR REPORT

SAMPLE: KEA-BCL-DF16/17-E052081 Fraction 7

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3034	M	Aromatic CH Stretch	
2926	S	Aliphatic CH Stretch	Shoulder
2856	S	Aliphatic CH Stretch	
1708	M	C=0 Stretch, shoulder	
1606	M		
1454	M	CH_2 bend	
1199	S	C-0 Stretch	Broad
1074	M	C-0 Stretch	
1008	M	C-0 Stretch	
943	W	Aromatic Substitution	
877	W	Aromatic Substitution	
785	W	Aromatic Substitution	

Aliphatic hydrocarbon with a carbonyl, probably ester and ketone. Ether appears to be present with a small amount of aromaticity.

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-20-81

Type of Source Vaporizing pot/automotive

Test Number E0502081 **Sample ID Number** KEA-BCL-CD/0-E052081

Sample Description Neat Condensate

Responsible Analyst Rachael L. Barbour **Date Analyzed** 6-10-81

Calculations and Report Reviewed By Robert J. Jakobsen **Report Date** 7-31-81

Instrument Digilab FTS-10 **Sample Cell Type** Film on KBr Plate

Utilized Max/Min Signal Intensity Values

Observations

Aliphatic hydrocarbon with significant amounts of aliphatic ether. Some carbonyl, probably ester and ketone, and some aromaticity.

IR REPORT

SAMPLE: KEA-BCL-CD/0-E052081

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2920	S	Aliphatic CH stretch	
2873	S	Aliphatic CH stretch	
1772	M	C=0 stretch	
1720	S	C=0 stretch	
1602	M	C=C stretch	
1465	M	CH_2 bend	
1352	M	CH_3 bend	
1300	M	CH_3 bend	
1286	M	C-0 stretch	
1247	M	C-0 stretch	
1190	M	C-0 stretch	
1107	S	C-0 stretch	
1014	M	C-0 stretch	
950	M	Aromatic substitution	
842	M	Aromatic substitution	
777	M	Aromatic substitution	
763	M	Aromatic substitution	
723	M	Aromatic substitution	

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-20-81

Type of Source Vaporizing pot/automotive

Test Number E052081 **Sample ID Number** KEA-BCL-BA-E052081

Sample Description Bottom ash

Responsible Analyst R. L. Barbour **Date Analyzed** 6-10-81

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Instrument Digilab FTS-10 **Sample Cell Type** Film on KBr plate

Utilized Max/Min Signal Intensity Values

Observations

Extremely large amounts of aliphatic hydrocarbon. There is carbonyl present, probably an aldehyde with an ester. Also some olefin present, and some aromatic structure.

IR REPORT

SAMPLE: KEA- BCL-BA-E052081

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3045	M	Aromatic CH Stretch	
2950	S	Aliphatic CH Stretch	
1772	W	C=0 Stretch	
1703	M	C=0 Stretch	
1602	W	C=C Stretch	
1463	S	CH_2 bend	
1377	M	CH_3 bend	
877	M	Aromatic Substitution	
815	M	Aromatic Substitution	
750	M	Aromatic Substitution	
721	M	Aromatic Substitution	

IR REPORT

SAMPLE: KEA-BCL-BA-E052081 Fraction 1

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2916	S	Aliphatic CH stretch	
2845	S	Aliphatic CH stretch	
1604	W	C=C stretch	
1460	M	CH_2 bend	
1377	M	CH_3 bend	

Aliphatic hydrocarbon with a small amount of aromaticity. Also a small amount of olefin.

IR REPORT

SAMPLE: KEA-BCL-BA-E052081 Fraction 2

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3047	W	Aromatic CH stretch	
3022	W	Aromatic CH stretch	
2953	M	Aliphatic CH stretch	
2924	S	Aliphatic CH stretch	
2854	M	Aliphatic CH stretch	
1699	W	C=C stretch	
1602	W	C=C stretch	
1454	M	C=C stretch	
1377	W	CH_3 bend	
1033	W	C-O stretch	
875	W	Aromatic substitution	
813	W	Aromatic substitution	
752	W	Aromatic substitution	

Large amount of aliphatic hydrocarbon with a significant amount of aromatic structure. Small amount of unidentifiable carbonyl and olefin present.

IR REPORT

SAMPLE: KEA-BCL-BA-E052081 Fraction 3

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3045	W	Aromatic CH stretch	
3020	W	Aromatic CH stretch	
2852	S	Aliphatic CH stretch	
1699	W	C=C stretch	
1602	W	C=C stretch	
1456	M	CH_2 bend	
1377	M	CH_3 bend	
877	W	Aromatic substitution	
815	W	Aromatic substitution	
754	W	Aromatic substitution	

Extremely large amounts of aliphatic hydrocarbon. Small amount of carbonyl, probably ketone and a small amount of olefin.

IR REPORT

SAMPLE: KEA-BCL-BA-E052081 Fraction 4

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2924	S	Aliphatic CH stretch	
2954	M	Aliphatic CH stretch	
1701	M	C=0 stretch	
1604	M	C=C stretch	
1456	M	CH_2 bend	
1377	M	CH_3 bend	
879	W	Aromatic substitution	
817	W	Aromatic substitution	
754	W	Aromatic substitution	

Large amount of aliphatic hydrocarbon with a carbonyl that appears to be a mixture of aldehyde, acid, and ester. Small amount of olefin and aromaticity.

IR REPORT

SAMPLE: KEA-BCL-BA-F052081 Fraction 5

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3016	W	Aromatic CH stretch	
2924	S	Aliphatic CH stretch	
2854	M	Aliphatic CH stretch	
1705	M	C=O stretch	
1602	M	C=C stretch	
1456	M	CH_2 bend	
1377	M	CH_3 bend	
879	W	Aromatic substitution	
817	W	Aromatic substitution	
756	W	Aromatic substitution	

Large amount of aliphatic hydrocarbon with carbonyl that appears to be aldehyde, acid, and ester. Small amount of olefin and aromaticity.

IR REPORT

SAMPLE: KEA-BCL-BA-E052081 Fraction 6

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2924	S	Aliphatic CH stretch	
2854	S	Aliphatic CH stretch	
1764	W	C=O stretch	
1707	M	C=O stretch	
1602	W	C=C stretch	
1456	M	CH_2 bend	
1377	M	CH_3 bend	
883	W	Aromatic substitution	
821	W	Aromatic substitution	
754	W	Aromatic substitution	
721	W	Aromatic substitution	

Large amount of aliphatic hydrocarbon with carbonyl that appears to be acid, ester, and aldehyde. Some aromatic structure present.

IR REPORT

SAMPLE: KEA-BCL-BA-E052081 Fraction 7

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3059	M	Aromatic CH stretch	
2924	S	Aliphatic CH stretch	
2854	S	Aliphatic CH stretch	
1838	M	C=0 stretch	
1772	M	C=0 stretch	
1712	S	C=0 stretch	
1597	S	C=C stretch	
1560	S	C=C stretch	
1402	S	CH_2 bend	
1286	S	C-0 stretch	
1207	M	C-0 stretch	
1138	M	C-0 stretch	
1078	M	C-0 stretch	

Mostly acid salt with aliphatic hydrocarbon. Some carbonyl present, appears to be mostly acid with aldehyde. Small amount of aromaticity present.

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA, RTP **Sample Acquisition Date** 6-18-81

Type of Source Air atomizing/automotive

Test Number E061881 **Sample ID Number** DREA-BCL-XR/MR-E061881

Sample Description XAD-2 and CH_2Cl_2 module rinse

Responsible Analyst R. L. Barbour **Date Analyzed** 7-5-81

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Instrument Digilab FTS-10 **Sample Cell Type** Film on KBr plate

Utilized Max/Min Signal Intensity Values

Observations

Large amounts of aliphatic hydrocarbon and carbonyl. Carbonyl appears to be ester with an acid. Small amounts of olefin and aromaticity.

IR REPORT

SAMPLE: DREA-BCL-MR/XR-E061881

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3061	W	Aromatic CH stretch	
2954	M	Aliphatic CH stretch	
2926	W	Aliphatic CH stretch	
2854	M	Aliphatic CH stretch	
1712	M	C=O stretch	
1604	W	C=C stretch	
1462	W	CH_2 bend	
1375	W	CH_3 bend	
1271	M	C-O stretch	
1176	M	C-O stretch	
1114	M	C-O stretch	
761	W	Aromatic substitution	

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA, RTP

Sample Acquisition Date 6-18-81

Type of Source Air atomizing/automotive

Test Number E061881

Sample ID Number DREA-BCL-CD/0-E061881

Sample Description Neat condensate

Responsible Analyst R. L. Barbour

Date Analyzed 7-5-81

Calculations and Report Reviewed By R. J. Jakobsen

Report Date 7-31-81

Instrument Digilab FTS-10

Sample Cell Type Film on KBr plate

Utilized Max/Min Signal Intensity Values

Observations

Mainly aliphatic hydrocarbon with carbonyl structures that appear to be mostly ester and ketone. Possible alcohol present, and significant aromatic structure. Not much sample present.

IR REPORT

SAMPLE: DREA-BCL-CD/0-E061881

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2954	S	Aliphatic CH stretch	
2920	S	Aliphatic CH stretch	
2850	S	Aliphatic CH stretch	
1735	S	C=0 stretch	
1701	S	C=0 stretch	
1652	S	C=C stretch	
1606	S	C=C stretch	
1508	S	C=C stretch	
1454	S	CH_2 bend	
1246	S	C-0 stretch	
1045	S	C-0 stretch	
777	S	Aromatic substitution	
736	S	Aromatic substitution	

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA, RTP

Sample Acquisition Date 6-18-81

Type of Source Air atomizing/automotive

Test Number E061881

Sample ID Number DREA-BCL-DF18/29-E061881

Sample Description Dilution filters #18-29 combined

Responsible Analyst R. L. Barbour

Date Analyzed 7-5-81

Calculations and Report Reviewed By R. J. Jakobsen

Report Date 7-31-81

Instrument Digilab FTS-10

Sample Cell Type Film on KBr plate

Utilized Max/Min Signal Intensity Values

Observations

Large amount of aliphatic hydrocarbon. Carbonyl compounds present that appear to be a mixture of acid, ester, aldehyde, and lactone. Probable ester present. Aromaticity present.

IR REPORT

SAMPLE: DREA-BCL-DF-E061881

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3037	W	Aromatic CH stretch	
2953	S	Aliphatic CH stretch	
2924	S	Aliphatic CH stretch	
2956	S	Aliphatic CH stretch	
1728	M	C=O stretch	
1608	W	C=C stretch	
1512	M	C=C stretch	
1462	M	CH_2 bend	
1377	M	CH_3 bend	
1365	M	CH_3 bend	
1288	M	C-O stretch	
1247	M	C-O stretch	
1186	M	C-O stretch	
1130	M	C-O stretch	
1068	M	C-O stretch	
929	W	Aromatic substitution	
829	W	Aromatic substitution	

IR REPORT

SAMPLE: DREA-BCL-DF-E061881 Fraction 1

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2960	S	Aliphatic CH stretch	
2924	S	Aliphatic CH stretch	
1462	W	CH_2 bend	
1377	W	CH_3 bend	

Extremely large amount of aliphatic hydrocarbon.

IR REPORT

SAMPLE: DREA-BCL-DF-E061881 Fraction 2

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2954	S	Aliphatic CH stretch	
2924	S	Aliphatic CH stretch	
2854	S	Aliphatic CH stretch	
1734	M	C=O stretch	
1600	M	C=C stretch	
1460	M	CH_2 bend	
1377	M	CH_3 bend	
1259	M	C-O stretch	
1089	M	C-O stretch	
1028	M	C-O stretch	
860	M	Aromatic substitution	
804	M	Aromatic substitution	
756	M	Aromatic substitution	

Mostly aliphatic hydrocarbon with a small amount of carbonyl that appears to be ester. Possible ether present with some aromaticity.

IR REPORT

SAMPLE: DREA-BCL-DF-E061881 Fraction 3

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2954	S	Aliphatic CH stretch	
2924	S	Aliphatic CH stretch	
2854	S	Aliphatic CH stretch	
1735	M	C=O stretch	
1600	M	C=C stretch	
1460	M	CH_2 bend	
1377	M	CH_3 bend	
1259	M	C-O stretch	
1163	M	C-O stretch	
794	M	Aromatic substitution	

Large amount of aliphatic hydrocarbon with some carbonyl that appears to be mostly ester.

IR REPORT

SAMPLE: DREA-BCL-DF-E061881 Fraction 4

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2954	S	Aliphatic CH stretch	
2926	S	Aliphatic CH stretch	
2856	M	Aliphatic CH stretch	
1732	M	C-O stretch	
1600	W	C=C stretch	
1581	W	C=C stretch	
1462	M	CH_2 bend	
1379	W	CH_3 bend	
1284	M	C-O stretch	
1122	M	C-O stretch	
1074	W	C-O stretch	

Mostly aliphatic hydrocarbon with what appears to be a combination of ester and lactone.

IR REPORT

SAMPLE: DREA-BCL-DF-E061881 Fraction 5

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2954	M	Aliphatic CH stretch	
2927	S	Aliphatic CH stretch	
2856	W	Aliphatic CH stretch	
1716	W	C=O stretch	
1608	W	C=C stretch	
1512	W	C=C stretch	
1460	W	CH_2 bend	
1365	W	CH_3 bend	
1247	W	C-O stretch	
1085	W	C-O stretch	
921	W	Aromatic substitution	
829	W	Aromatic substitution	

Mostly aliphatic hydrocarbon with a carbonyl that appears to be a mixture of ester, acid. and lactone. Some aromaticity present.

SAMPLE: DREA-BCL-DF-E061881 Fraction 6

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3059	M	Aromatic CH stretch	
3039	M	Aromatic CH stretch	
2953	S	Aliphatic CH stretch	
2927	S	Aliphatic CH stretch	
2870	S	Aliphatic CH stretch	
1716	M	C=0 stretch	
1608	M	C=C stretch	
1581	M	C=C stretch	
1512	S	C=C stretch	
1460	M	CH_2 bend	
1365	M	CH_3 bend	
1294	M	C-0 stretch	
1246	S	C-0 stretch	
1186	M	C-0 stretch	
1130	S	C-0 stretch	
1066	S	C-0 stretch	
887	M	Aromatic substitution	
929	M	Aromatic substitution	

Large amount of aliphatic hydrocarbon present with carbonyl that appears to be a mixture of ester, acid and lactone. Possible alcohol present with some aromaticity.

IR REPORT

SAMPLE: DREA-BCL-DF-E061881 Fraction 7

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3041	W	Aromatic CH stretch	
2953	S	Aliphatic CH stretch	
2927	S	Aliphatic CH stretch	
2872	M	Aliphatic CH stretch	
1689	W	C=C stretch	
1606	S	C=C stretch	
1512	M	C=C stretch	
1456	M	CH_2 bend	
1425	M	CH_2 bend	
1292	W	C-O stretch	
1247	S	C-O stretch	
1186	W	C-O stretch	
1101	W	C-O stretch	
921	W	Aromatic substitution	
829	W	Aromatic substitution	

Appears to be mostly acid salt with a large amount of aliphatic hydrocarbon and carbonyl. The carbonyl appears to be a mixture of acid and ester. Significant amount of aromaticity.

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA, RTP **Sample Acquisition Date** 6-18-81

Type of Source Air atomizing/automotive

Test Number E061881 **Sample ID Number** DREA-BCL-PFa7/17-E061881

Sample Description Particulate filters #7 - 17 combined

Responsible Analyst R. L. Barbour **Date Analyzed** 7-5-81

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Instrument Digilab FTS-10 **Sample Cell Type** Film on KBr plate

Utilized Max/Min Signal Intensity Values

Observations

Aliphatic hydrocarbon present with a small amount of carbonyl; appears to be an ester. Possible alcohol present. Small amount of aromaticity. Very little sample is present.

IR REPORT

SAMPLE: DREA-BCL-PFa7/17-E061881

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2922	S	Aliphatic CH stretch	
2852	M	Aliphatic CH stretch	
1739	W	C=0 stretch	
1460	W	CH_2 bend	
1392	W	CH_3 bend	
1211	W	C-0 stretch	
1178	W	C-0 stretch	
887	W	Aromatic substitution	
798	W	Aromatic substitution	

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 11/81

Type of Source Air atomizing/automotive

Test Number E061881 **Sample ID Number** DREA-BCL-1C/3C/10C-E061881

Sample Description 1 μm, 3 μm, and 10 μm cyclone catch

Responsible Analyst R. L. Barbour **Date Analyzed** 12/81

Calculations and Report Reviewed By R. J. Jakobsen **Report Date**

Instrument Digilab FTS-10 **Sample Cell Type** Film on KBr plate

Utilized Max/Min Signal Intensity Values

Observations

Mostly aromatic hydrocarbon. Carbonyl present which is mainly ester. Possible ether present. Not much sample present.

IR REPORT

SAMPLE: DREA-BCL-1C/3C/10C-E061881

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2920	S	Aliphatic CH stretch	Shoulder
2850	M	Aliphatic CH stretch	
1740	M	C=0 stretch	Broad
1600	W	C=C stretch	Broad
1450	W	CH_2 bend	
1390	W	CH_3 bend	
1280	W	C-0 stretch	
1100	W	C-0 stretch	
1020	W	C-0 stretch	

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA, RTP

Sample Acquisition Date 6-25-81

Type of Source Air atomizing/truck

Test Number E062581

Sample ID Number DREA-BCL-XR/MR-E062581

Sample Description XAD-2 + CH_2Cl_2 organic module rinse

Responsible Analyst R. L. Barbour

Date Analyzed 7-5-81

Calculations and Report Reviewed By R. J. Jakobsen

Report Date 7-31-81

Instrument Digilab FTS-10

Sample Cell Type Film on KBr plate

Utilized Max/Min Signal Intensity Values

Observations

Large amounts of what appears to be a primary amine salt. Significant amount of aliphatic hydrocarbon and carbonyl. The carbonyl is probably a mixture of ester and acid. Small amount of olefin and aromaticity.

IR REPORT

SAMPLE: DREA-BCL-XR/MR-E062581

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3230	S	NH_3 stretch	
2956	M	Aliphatic CH stretch	
2926	S	Aliphatic CH stretch	
2856	M	Aliphatic CH stretch	
2671	W	NH_3 stretch	
2547	W	NH_3 stretch	
1705	M	C=0 stretch	
1604	W	C=C stretch	
1462	S	CH_2 bend	
1419	M	CH_2 bend	
1381	M	CH_3 bend	
1284	M	C-0 stretch	
1234	M	C-0 stretch	
1197	M	C-0 stretch	
1114	M	C-0 stretch	
937	W	Aromatic substitution	
883	W	Aromatic substitution	
758	M	Aromatic substitution	

IR REPORT

SAMPLE: DREA-BCL-XR/MR-E062581 Fraction 1

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2954	M	Aliphatic CH stretch	
2924	S	Aliphatic CH stretch	
1460	W	CH_2 bend	
1377	W	CH_3 bend	

Large amount of aliphatic hydrocarbon.

IR REPORT

SAMPLE: DREA-BCL-XR/MR-E062581 Fraction 2

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2922	S	Aliphatic CH stretch	
2852	M	Aliphatic CH stretch	
1735	M	C=O stretch	
1462	M	CH_2 bend	
1375	M	CH_3 bend	
1259	M	C-O stretch	
1178	M	C-O stretch	
1143	M	C-O stretch	
1093	M	C-O stretch	
1076	M	C-O stretch	
1029	M	C-O stretch	
800	M	Aromatic substitution	
700	W	Aromatic substitution	

Mostly aliphatic hydrocarbon with a small amount of carbonyl; appears to be mostly ester and lactone. Small amount of aromaticity.

IR REPORT

SAMPLE: DREA-BCL-XR/MR-E062581 Fraction 3

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2926	S	Aliphatic CH stretch	
2854	M	Aliphatic CH stretch	
1737	M	C=O stretch	
1460	M	CH_2 bend	
1377	M	CH_3 bend	
1271	M	C-O stretch	
1168	M	C-O stretch	
798	W	Aromatic substitution	
709	M	Aromatic substitution	

Large amount of aliphatic hydrocarbon. Carbonyl present, probably ester. Some aromaticity.

IR REPORT

SAMPLE: DREA-BCL-XR/MR-E062581 Fraction 4

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2958	S	Aliphatic CH stretch	
2926	S	Aliphatic CH stretch	
2854	M	Aliphatic CH stretch	
1735	M	C=O stretch	
1664	M	C=C stretch	
1602	M	C=C stretch	
1456	M	CH_2 bend	
1365	M	CH_3 bend	
1273	M	C-O stretch	
1176	M	C-O stretch	
1118	M	C-O stretch	
831	W	Aromatic substitution	
800	W	Aromatic substitution	
756	W	Aromatic substitution	

Large amount of aliphatic hydrocarbon and carbonyl; appears to be a mixture of ester and acid. Small amount of olefin and aromaticity.

IR REPORT

SAMPLE: DREA-BCL-XR/MR-E062581 Fraction 5

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2958	W	Aliphatic CH stretch	
2926	S	Aliphatic CH stretch	
2854	W	Aliphatic CH stretch	
1726	W	C=O stretch	
1689	W	C=C stretch	
1458	W	CH_2 bend	
1365	W	CH_3 bend	
1273	M	C-O stretch	
1247	M	C-O stretch	
1176	W	C-O stretch	
968	W	Aromatic substitution	
908	W	Aromatic substitution	

Aliphatic hydrocarbon present, carbonyl present, and probably a combination of ester, acid, lactone, and ketone. Very small amount of aromaticity.

SAMPLE: DREA-BCL-XR/MR-E062581 Fraction 6

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3064	M	Aromatic CH stretch	
3032	M	Aromatic CH stretch	
2926	S	Aliphatic CH stretch	
2856	S	Aliphatic CH stretch	
2669	M		
2549	W		
1705	S	C=O stretch	
1604	M	C=C stretch	
1585	M	C=C stretch	
1454	M	CH_2 bend	
1415	M	CH_2 bend	
1317	M	CH_3 bend	
1286	S	C-O stretch	
1246	M	C-O stretch	
1176	M	C-O stretch	
1111	M	C-O stretch	
1072	M	C-O stretch	
1026	M	C-O stretch	
937	M	Aromatic substitution	
806	W	Aromatic substitution	
661	W	Aromatic substitution	

Large amounts of carboxylic acid with ester and lactone. Also a large amount of aliphatic hydrocarbon. Possible primary amine salt. Some aromaticity present.

IR REPORT

SAMPLE: DREA-BCL-XR/MR-E062581 Fraction 7

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2960	M	Aliphatic CH stretch	
2931	M	Aliphatic CH stretch	
2872	M	Aliphatic CH stretch	
1710	M	C=O stretch	
1597	S	C=C stretch	
1562	S	C=C stretch	
1417	S	CH_2 bend	
1247	M	C-O stretch	
1103	S	C-O stretch	

Appears to be mostly acid salt with some aliphatic hydrocarbon. Carbonyl present, probably ester and acid. Possible alcohol present. Small amount of aromaticity.

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA, RTP

Sample Acquisition Date 6-25-81

Type of Source Air atomizing/truck

Test Number E062581

Sample ID Number DREA-BCL-CD/O-E062581

Sample Description Neat condensate

Responsible Analyst R. L. Barbour

Date Analyzed 7-5-81

Calculations and Report Reviewed By R. J. Jakobsen

Report Date 7-31-81

Instrument Digilab FTS-10

Sample Cell Type Film on KBr plate

Utilized Max/Min Signal Intensity Values

Observations

Large amount of aliphatic hydrocarbon. Carbonyl present that appears to be ester and acid. Small amount of olefin and aromaticity.

IR REPORT

SAMPLE: DREA-BCL-CD/O-E062581

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2924	S	Aliphatic CH stretch	
1720	M	C=O stretch	
1608	W	C=C stretch	
1512	M	C=C stretch	
1460	M	CH_2 bend	
1365	M	CH_3 bend	
1288	M	C-O stretch	
1246	S	C-O stretch	
1126	S	C-O stretch	
1066	S	C-O stretch	
829	M	Aromatic substitution	

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA, RTP **Sample Acquisition Date** 6-25-81

Type of Source Air atomizing/truck

Test Number E062581 **Sample ID Number** DREA-BCL-DF31/42-E062581

Sample Description Dilution filters #31 - 42 combined

Responsible Analyst R. L. Barbour **Date Analyzed** 7-5-81

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Instrument Digilab FTS-10 **Sample Cell Type** Film on KBr plate

Utilized Max/Min Signal Intensity Values

Observations

Large amounts of aliphatic hydrocarbon. Small amount of carbonyl, probably ester, acid and lactone. Probable ester present and a small amount of aromaticity.

IR REPORT

SAMPLE: DREA-BCL-DF31/42-E062581

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2953	M	Aliphatic CH stretch	
2924	S	Aliphatic CH stretch	
2956	S	Aliphatic CH stretch	
1730	W	C=O stretch	
1610	W	C=C stretch	
1512	W	C=C stretch	
1460	M	CH_2 bend	
1377	W	CH_3 bend	
1365	W	CH_3 bend	
1288	W	C-O stretch	
1247	M	C-O stretch	
1186	W	C-O stretch	
1128	M	C-O stretch	
1070	W	C-O stretch	
941	W	Aromatic substitution	
829	W	Aromatic substitution	
806	W	Aromatic substitution	

IR REPORT

SAMPLE: DREA-BCL-DF31/42-E062581 Fraction 1

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2954	S	Aliphatic CH stretch	
2924	S	Aliphatic CH stretch	
2854	M	Aliphatic CH stretch	
1462	M	CH_2 bend	
1377	W	CH_3 bend	

Large amount of aliphatic hydrocarbon with a small amount of aromaticity.

IR REPORT

SAMPLE: DREA-BCL-DF31/42-E062581 Fraction 2

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2956	M	Aliphatic CH stretch	
2926	S	Aliphatic CH stretch	
2854	M	Aliphatic CH stretch	
1735	W	C=0 stretch	
1460	W	CH_2 bend	
1379	W	CH_3 bend	
1261	M	C-0 stretch	
1089	M	C-0 stretch	
1033	M	C-0 stretch	
858	W	Aromatic substitution	
806	M	Aromatic substitution	
758	W	Aromatic substitution	
700	W	Aromatic substitution	

Large amount of aliphatic hydrocarbon with a small amount of what appears to be ester. Some aromatic structure present.

IR REPORT

SAMPLE: DREA-BCL-DF31/42-F062581 Fraction 3

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2954	M	Aliphatic CH stretch	
2926	S	Aliphatic CH stretch	
2854	M	Aliphatic CH stretch	
1734	M	C=O stretch	
1462	M	CH_2 bend	
1379	W	CH_3 bend	
1271	M	C-O stretch	
804	W	Aromatic substitution	
742	W	Aromatic substitution	

Large amount of aliphatic hydrocarbon with a carbonyl, probably ester. Very small amount of aromaticity.

IR REPORT

SAMPLE: DREA-BCL-DF31/42-E062581 Fraction 4

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3064	W	Aromatic CH stretch	
2956	S	Aliphatic CH stretch	
2927	S	Aliphatic CH stretch	
2856	M	Aliphatic CH stretch	
1730	S	C=O stretch	
1600	W	C=C stretch	
1581	W	C=C stretch	
1462	M	CH_2 bend	
1379	M	CH_3 bend	
1284	M	C-O stretch	
1122	M	C-O stretch	
1074	M	C-O stretch	
744	W	Aromatic substitution	
704	W	Aromatic substitution	

Large amount of aliphatic hydrocarbon with a significant amount of carbonyl; appears to be mostly ester and acid with lactone. Small amount of aromaticity.

IR REPORT

SAMPLE: DREA-BCL-DF31/42-E062581 Fraction 5

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2926	S	Aliphatic CH s-retch	
2856	M	Aliphatic CH stretch	
1718	W	C=O stretch	
1608	W	C=C stretch	
1512	W	C=C stretch	
1460	W	CH_2 bend	
1365	W	CH_3 bend	
1247	W	C-O stretch	
923	W	Aromatic substitution	
829	W	Aromatic substitution	

Large amount of aliphatic hydrocarbon with carbonyl structures that are probably ester, acid and lactone. A small amount of aromatic structure present.

IR REPORT

SAMPLE: DREA-BCL-DF31/42-E062581 Fraction 6

Wave Number (cm^{-1})	Intensity	Assignment	Comments
3057	W	Aromatic CH stretch	
3039	W	Aromatic CH stretch	
2927	S	Aliphatic CH stretch	
2868	S	Aliphatic CH stretch	
1718	M	C-O stretch	
1610	W	C=C stretch	
1512	M	C=C stretch	
1458	M	CH_2 bend	
1365	M	CH_3 bend	
1294	M	C-O stretch	
1246	S	C-O stretch	
1186	M	C-O stretch	
1128	M	C-O stretch	
1066	M	C-O stretch	

Large amount of aliphatic hydrocarbon with carbonyl that appears to be a mixture of ester, acid, aldehyde, and lactone. Some aromaticity present.

IR REPORT

SAMPLE: DREA-BCL-DF31/42-E062581 Fraction 7

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2953	S	Aliphatic CH stretch	
2926	S	Aliphatic CH stretch	
2856	M	Aliphatic CH stretch	
1712	M	C=0 stretch	
1606	M	C=C stretch	
1512	M	C=C stretch	
1458	M	CH_2 bend	
1425	M	CH_2 bend	
1365	M	CH_3 bend	
1292	M	C-0 stretch	
1246	M	C-0 stretch	
1186	M	C-0 stretch	
1126	M	C-0 stretch	
928	M	Aromatic substitution	

Large amount of aliphatic hydrocarbon with acid salt. Carbonyl present probably acid and ester. Small amount of aromaticity.

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA, RTP **Sample Acquisition Date** 6-25-81

Type of Source Air atomizinq/truck

Test Number E062581 **Sample ID Number** DREA-BCL-PFa1/12/1c-E062581

Sample Description Particulate Filters #1 - 12 and 1 μm cyclone catch

Responsible Analyst R. L. Barbour **Date Analyzed** 7-5-81

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Instrument Digilab FTS-10 **Sample Cell Type** Film on KBr plate

Utilized Max/Min Signal Intensity Values

Observations

Mainly aliphatic hydrocarbon with what appears to be ester with ketone and possibly a small amount of alcohol. A small amount of aromaticity present. Very little sample present.

IR REPORT

SAMPLE: DREA-BCL-PFa1/12/1c-E062581

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2956	W	Aliphatic CH stretch	
2922	W	Aliphatic CH stretch	
1735	W	C=O stretch	
1652	W	C=C stretch	
1458	W	CH_2 bend	
1436	W	CH_2 bend	
1373	W	CH_3 bend	
1276	M	C-O stretch	

IR ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA, RTP

Sample Acquisition Date 6-25-81

Type of Source Air atomizing/truck

Test Number E062581

Sample ID Number DREA-BCL-3c/10c-E062581

Sample Description 3 μm to 10 μm cyclone catch

Responsible Analyst R. L. Barbour

Date Analyzed 7-5-81

Calculations and Report Reviewed By R. J. Jakobsen

Report Date 7-31-81

Instrument Digilab FTS-10

Sample Cell Type Film on KBr plate

Utilized Max/Min Signal Intensity Values

Observations

Aliphatic hydrocarbon present. Small amount of carbonyl which appears to be mostly ester and ketone. Possible alcohol present with a small amount of aromaticity. Very little sample present.

IR REPORT

SAMPLE: DREA-BCL-3c/10c-E062581

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2922	S	Aliphatic CH stretch	
2850	S	Aliphatic CH stretch	
1737	M	C=O stretch	
1652	M	C=C stretch	
1458	M	CH_2 bend	
1016	M	C-O stretch	
719	W	Aromatic substitution	
605	W	Aromatic substitution	

APPENDIX A
LOW RESOLUTION MASS SPECTROMETRY RESULTS
LRMS ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-7-81

Type of Source Vaporizing pot/truck

Test Number E050781 **Sample ID Number** KEA-BCL-XR/MR-E050781

Sample Description XAD-2 and organic module rinse; liquid chromatography fractions #6 & 7.

Analyst Responsible R. M. Thompson **Date Analyzed** 7-25-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

Instrument Finnigan 3200

Resolution ∿600

Sample Size 2µl **Batch Inlet** **Probe Inlet** ambient →350°C

Observations

LRMS REPORT

SAMPLE: Kea-BCL-XR/MR-E050781; liquid chromatography fractions #6 & 7.

Major Categories

Intensity	Category	MW Range
100	Carboxylates	200-600
100	Carboxylic acids	120-200
100	Alkanes	200-600

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition
100	Carboxylic acid salts	44	CO_2
100	Benzoic acid	122	$C_7H_6O_2$

Other

LRMS ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA/RTP **Sample Acquisition Date** May 7, 1981

Type of Source Vaporizing pot/truck

Test Number E050781 **Sample ID Number** KEA-BCL-DF13/14-E050781

Sample Description Dilution filters #13 & #14;
liquid chromatography fractions #6 & 7

Analyst Responsible R. M. Thompson **Date Analyzed** August 11, 1981 **Time**

Calculations and Report Reviewed By R. L. Barbour **Report Date** August 20, 1981

Instrument Finnigan 3200

Resolution ∿600

Sample Size 2 µl **Batch Inlet** **Probe Inlet** ambient → 350°C

Observations

LRMS REPORT

SAMPLE: KEA-BCL-DF13/14-E050781; liquid chromatography faction #6 and #7

Major Categories

Intensity	Category	MW Range
100	Aliphatic hydrocarbons	250-400
100	Carboxylic acids	250-400

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition
10	Palmitic (or other C_{16}) acid	256	$C_{16}H_{32}O_2$
10	Stearic (or other C_{18}) acid	284	$C_{18}H_{36}O_2$
100	Substituted cyclohexene	54	
		67	
		82	

Other

LRMS ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA/RTP **Sample Acquisition Date** May 20, 1981

Type of Source Vaporizing pot/truck

Test Number E052081 **Sample ID Number** KEA-BCL-XR/MR-E052081

Sample Description XAD-2 and organic module rinse; liquid chromatography factions #6 and #7

Analyst Responsible R. M. Thompson **Date Analyzed** 8-11-81 **Time**

Calculations and Report Reviewed By R. L. Barbour **Report Date** August 20, 1981

Instrument Finnigan 3200

Resolution ~600

Sample Size 2 μl **Batch Inlet** **Probe Inlet** ambient → 350°C

Observations

LRMS REPORT

SAMPLE: KEA-BCL-XR/MR-E052081; liquid chromatography fractions #6 and #7

Major Categories

Intensity	Category	MW Range
100	Carboxylic acids	120-200

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition
100	Benzoic acid	122	$C_7H_6O_2$

Other

LRMS ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA/RTP **Sample Acquisition Date** May 20, 1981

Type of Source Vaporizing pot/automotive

Test Number E052081 **Sample ID Number** KEA-BCL-BA-E052081

Sample Description Bottom ash; liquid chromatography fraction #1

Analyst Responsible R. M. Thompson **Date Analyzed** 8-11-81 **Time**

Calculations and Report Reviewed By R. L. Barbour **Report Date** August 20, 1981

Instrument Finnigan 3200

Resolution ∿600

Sample Size 2 μl **Batch Inlet** **Probe Inlet** ambient → 350°C

Observations

LRMS REPORT

SAMPLE: KEA-BCL-BA-E052081; liquid chromatography fraction #1

Major Categories

Intensity	Category	MW Range
100	Aliphatic hydrocarbon	250-500
100	Sulfur	60-260

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition
100	Sulfur	64-256	$S_2 \rightarrow S_8$

Other

LRMS ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA; RTP **Sample Acquisition Date** May 20, 1981

Type of Source Vaporizing pot/automotive

Test Number E052081 **Sample ID Number** KEA-BCL-BA-E052081

Sample Description Bottom ash; liquid chromatography fraction #2 and #3

Analyst Responsible R. M. Thompson **Date Analyzed** 8-11-81 **Time**

Calculations and Report Reviewed By R. L. Barbour **Report Date** August 20, 1981

Instrument Finnigan 3200

Resolution ∿600

Sample Size 2 μl **Batch Inlet** **Probe Inlet** ambient → 350°C

Observations

LRMS REPORT

SAMPLE: KEA-BCL-BA-E052081; liquid chromatography fractions #2 and #3

Major Categories

Intensity	Category	MW Range
100	Aromatic hydrocarbons	250–350

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition
100	Alkyl-PAH	252	
		266	
		276	
		290	

Other

LRMS ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA; RTP   **Sample Acquisition Date** May 20, 1981

Type of Source Vaporizing pot/automotive

Test Number E052081   **Sample ID Number** KEA-BCL-BA-E052081

Sample Description Bottom ash; liquid chromatography fractions #4 and #5

Analyst Responsible R. M. Thompson   **Date Analyzed** 8-11-81   **Time**

Calculations and Report Reviewed By R. L. Barbour   **Report Date** August 20, 1981

Instrument Finnigan 3200

Resolution ∿600

Sample Size 2 μl   **Batch Inlet**   **Probe Inlet** ambient → 350°C

Observations

LRMS REPORT

SAMPLE: KEA-BCL-BA-E052081; liquid chromatography fractions #4 and #5

Major Categories

Intensity	Category	MW Range
100	Aromatic hydrocarbons	120–240

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition
10	Naphthalene	128	$C_{10}H_8$
100	PAH-3 Ring	180	
10	Alkyl-PAH-3 Ring	208	
10	PAH	196	
1	Alkyl-PAH	224	

Other

LRMS ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA; RTP

Sample Acquisition Date May 20, 1981

Type of Source Vaporizing pot/automotive

Test Number E052081

Sample ID Number KEA-BCL-BA-E052081

Sample Description Bottom ash; liquid chromatography fractions #6 and #7

Analyst Responsible R. M. Thompson

Date Analyzed 8-11-81

Time

Calculations and Report Reviewed By R. L. Barbour

Report Date August 20, 1981

Instrument Finnigan 3200

Resolution ~600

Sample Size 2 μl

Batch Inlet

Probe Inlet ambient → 350°C

Observations

LRMS REPORT

SAMPLE: KEA-BCL-BA-E052081; liquid chromatography fractions #6 and 7

Major Categories

Intensity	Category	MW Range
100	Alkanes	200-400
100	Carboxylic acids	120-200

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition
100	Benzoic acid	122	$C_7H_6O_2$
100	Palmitic acid	256	$C_{16}H_{32}O_2$
10	Stearic acid	284	$C_{18}H_{36}O_2$

Other

LRMS ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA/RTP **Sample Acquisition Date** June 18, 1981

Type of Source Air atomizing/automotive

Test Number E061881 **Sample ID Number** DREA-BCL-DF18/29-E061881

Sample Description Dilution filters #18 through 29; liquid chromatography fractions #6 and 7

Analyst Responsible R. M. Thompson **Date Analyzed** 8-11-81 **Time**

Calculations and Report Reviewed By R. L. Barbour **Report Date** August 20, 1981

Instrument Finnigan 3200

Resolution ∿600

Sample Size 2 μl **Batch Inlet** **Probe Inlet** ambient → 350°C

Observations

LRMS REPORT

SAMPLE: DREA-BCL-DF18/29-E061881; liquid chromatography fractions #6 and 7

Major Categories

Intensity	Category	MW Range
100	Carboxylic acids	250-450
100	Aromatic hydrocarbon	250-400

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition
100	Alkylbenzenes	135	$C_9H_{11}O$
100	Acids	223	--
		267	--
		311	--

Other

LRMS ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA/RTP **Sample Acquisition Date** June 25, 1981

Type of Source Air atomizing/truck

Test Number E062581 **Sample ID Number** DREA-BCL-XR/MR-E062581

Sample Description XAD-2 and organic module rinse; liquid chromatography fractions #6 and #7

Analyst Responsible R. M. Thompson **Date Analyzed** 8-11-81 **Time**

Calculations and Report Reviewed By R. L. Barbour **Report Date** August 20, 1981

Instrument Finnigan 3200

Resolution ~600

Sample Size 2 μl **Batch Inlet** **Probe Inlet** ambient → 350°C

Observations

LRMS REPORT

SAMPLE: DREA-BCL-XR/MR-E062581; liquid chromatography fractions #6 and #7

Major Categories

Intensity	Category	MW Range
	No volatile components observed	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS ANALYSIS REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA/RTP **Sample Acquisition Date** June 25, 1981

Type of Source Air atomizing/truck

Test Number E062581 **Sample ID Number** DREA-BCL-DF31/42-E062581

Sample Description Dilution filters #31 through #42; liquid chromatography fractions #6 and #7

Analyst Responsible R. M. Thompson **Date Analyzed** 8/11/81 **Time**

Calculations and Report Reviewed By R. L. Barbour **Report Date** August 20, 1981

Instrument Finnigan 3200

Resolution ∿600

Sample Size 2 μl **Batch Inlet** **Probe Inlet** ambient → 350°C

Observations

LRMS REPORT

SAMPLE: DREA-BCL-DF31/42-E062581; liquid chromatography fractions #6 and #7

Major Categories

Intensity	Category	MW Range
100	Carboxylic acids	250-400
100	Aromatic hydrocarbons	250-400

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition
100	Alkylbenzenes	135	$C_9H_{11}O$
100	Acids	223	--
		267	--
		311	--

Other

APPENDIX A
ORGANIC EXTRACT SUMMARIES

ORGANIC EXTRACT SUMMARY REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-7-81

Type of Source Vaporizing pot/truck

Test Number E050781 **Sample ID Number** KEA-BCL-XR/MR-E050781

Sample Description XAD-2 and organic module rinse

Original Sample Volume or Mass 134g

Analyst Responsible R. L. Barbour **Date Analyzed** 7-24-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

ORGANIC EXTRACT SUMMARY TABLE

Sample KEA-BCL-XR/MR-E050781

	LC1	LC2	LC3	LC4	LC5	LC6	LC7	Σ
Total Organics, mg	3.27	2.15	4.75	2.49	3.72	21.78	3.01	41.17
TCO, mg	2.24	2.08	1.47	0.70	0.83	1.07	0.52	8.91
GRAV, mg	1.03	0.07	3.28	1.79	2.89	20.71	2.49	32.36

Category	**Assigned intensity – mg/m^3**							
Aliphatic hydrocarbon	100-0.10	10-0.01	100-0.15	100-0.08	10-0.01	100-0.68	100-0.09	
Ester		10-0.01	10-0.02	10-0.01	10-0.01	10-0.07	10-0.01	
Ketone		10-0.01			10-0.01		10-0.01	
Alcohol		10-0.01						
Aromatic hydrocarbon		10-0.01	10-0.02	10-0.01	10-0.01	1-0.01		
Acid					10-0.01	10-0.07	10-0.01	
Alkyl ether					100-0.12			
Carboxylic acid salts						100-0.68	100-0.09	
Benzoic acid						100-0.68	100-0.09	
Lactone						10-0.07		
Olefin						1-0.01		

ORGANIC EXTRACT SUMMARY REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-7-81

Type of Source Vaporizing pot/truck

Test Number E050781 **Sample ID Number** KEA-BCL-DF13/14-E050781

Sample Description Dilution filters #13 and 14.

Original Sample Volume or Mass 23.72g

Analyst Responsible R. L. Barbour **Date Analyzed** 7-24-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

ORGANIC EXTRACT SUMMARY TABLE

Sample KEA-BCL-DF13/14-E050781

	LC1	LC2	LC3	LC4	LC5	LC6	LC7	Σ
Total Organics, mg	30.30	7.00	6.76	4.97	3.46	36.15	3.40	92.04
TCO, mg	0.42	1.57	0.76	----	0.17	0.17	----	3.09
GRAV, mg	29.88	5.43	6.00	4.97	3.29	35.98	3.40	88.95

Assigned intensity – mg/m^3

Category								
Aliphatic hydrocarbon	100-0.38	100-0.09	100-0.08	100-0.06	100-0.04	100-0.45	10-0.004	1.104
Olefin		10-0.01	10-0.01					0.02
Palmitic (or other C16) acid						10-0.05	10-0.004	0.054
Stearic (or other C18) acid						10-0.05	10-0.004	0.054
Substituted cyclohexene						100-0.45	100-0.04	0.49
Ether				10-0.01	10-0.004			0.014
Ester			10-0.01	100-0.06	10-0.004	100-0.45	10-0.004	0.528
Ketone			10-0.01			100-0.45	10-0.004	0.464
Lactone					10-0.004	100-0.45	10-0.004	0.458
Aromatic hydrocarbon		10-0.01	10-0.01	10-0.01	10-0.004		10-0.004	0.038

ORGANIC EXTRACT SUMMARY REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-20-81

Type of Source Vaporizing pot/automotive

Test Number E052081 **Sample ID Number** KEA-BCL-XR/MR-E052081

Sample Description XAD-2 and organic module rinse.

Original Sample Volume or Mass 135g

Analyst Responsible R. L. Barbour **Date Analyzed** 7-24-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

ORGANIC EXTRACT SUMMARY TABLE

Sample KEA-BCL-XR/MR-E052081

	LC1	LC2	LC3	LC4	LC5	LC6	LC7	Σ
Total Organics, mg	3.02	0.45	2.02	1.67	1.62	21.65	2.23	32.66
TCO, mg	0.94	0.39	0.04	----	0.07	6.64	----	8.08
GRAV, mg	2.08	0.06	1.98	1.67	1.55	15.01	2.23	24.58

Category **Assigned intensity – mg/m^3**

Aliphatic hydrocarbon	10-0.01	10-0.002	100-0.07	100-0.06	100-0.05	100-0.72	10-0.01	0.922
Ester		10-0.002	10-0.01	10-0.01	100-0.05	10-0.07		0.142
Ketone			10-0.01	10-0.01	10-0.01			0.03
Aromatic hydrocarbon			10-0.01	10-0.01	10-0.01	1-0.01		0.04
Anhydride				10-0.01				0.01
Acid		10-0.002				100-0.72		0.722
Benzoic acid						100-0.72	100-0.07	0.79
Acid salt							100-0.07	0.07
Lactone					10-0.01			

ORGANIC EXTRACT SUMMARY REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-20-81

Type of Source Vaporizing pot/automotive

Test Number E052081 **Sample ID Number** KEA-BCL-DF16/17-E052081

Sample Description Dilution filters #16 and 17.

Original Sample Volume or Mass 21.312g

Analyst Responsible R. L. Barbour **Date Analyzed** 7-24-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

ORGANIC EXTRACT SUMMARY TABLE

Sample KEA-BCL-DF16/17-E052081

	LC1	LC2	LC3	LC4	LC5	LC6	LC7	Σ
Total Organics, mg	31.17	0.80	14.08	12.27	6.45	35.12	10.14	110.03
TCO, mg	-----	----	2.63	-----	----	-----	------	2.63
GRAV, mg	31.17	0.80	11.45	12.27	6.45	35.12	10.14	107.4

Category	**Assigned intensity – mg/m^3**							
Aliphatic hydrocarbon	100-0.25	100-0.01	100-0.11	100-0.10	100-0.05	10-0.03	100-0.08	0.63
Ester			10-0.01		10-0.005	100-0.28	10-0.01	0.305
Ketone			10-0.01	10-0.01	10-0.005	100-0.28	10-0.01	0.315
Olefin			10-0.01					0.01
Ether			10-0.01		10-0.005	10-0.03	10-0.01	0.055
Carboxylic acid				10-0.01				0.01
Aromatic hydrocarbon				10-0.01	10-0.005	10-0.03	10-0.01	0.055
Aldehyde						100-0.28		0.28

ORGANIC EXTRACT SUMMARY REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 5-20-81

Type of Source Vaporizing pot/automotive

Test Number E052081 **Sample ID Number** KEA-BCL-BA-E052081

Sample Description Bottom ash.

Original Sample Volume or Mass 297g

Analyst Responsible R. L. Barbour **Date Analyzed** 7-24-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

ORGANIC EXTRACT SUMMARY TABLE

Sample KEA-BCL-BA-E052081

	LC1	LC2	LC3	LC4	LC5	LC6	LC7	Σ
Total Organics, mg	103.06	17.61	24.61	14.37	5.37	11.81	1.23	178.06
TCO, mg	0.04	0.01	0.10	0.23	0.37	0.80	----	1.55
GRAV, mg	103.02	17.60	24.51	14.14	5.00	11.01	1.23	176.51

Assigned intensity – mg/kg

Category	LC1	LC2	LC3	LC4	LC5	LC6	LC7	Σ
Aliphatic hydrocarbon	100-347.0	100-59.29	100-82.86	100-48.38	100-18.08	100-39.76	10-0.41	595.78
Sulfur	100-347.0							347.0
Olefin	10-34.7	10-5.93	10-8.29	10-4.84	10-1.81	10-3.98		59.55
Aromatic hydrocarbon	10-34.7	100-59.29	100-82.86	10-4.84	10-1.81	10-3.98	10-0.41	187.89
Alkyl-PAH		100-59.29	100-82.86	1-0.48	1-0.18			142.81
Ketone			10-8.29					8.29
Aldehyde				10-4.84	10-1.81	10-3.98		10.63
Acid				10-4.84	10-1.81	10-3.98	10-0.41	11.04
Ester				10-4.84	10-1.81	10-3.98		10.63
Naphthalene				10-4.84				4.84
Alkyl-PAH-3-Ring				10-4.84	10-1.81			6.65
PAH-3-Ring				100-48.38	100-18.08			66.46
PAH				10-4.84	10-1.81			6.65
Benzoic acid						100-39.76	100-4.14	43.9
Palmitic acid						100-39.76	100-4.14	43.9
Stearic acid						10-3.98	10-0.41	4.39

[1] Concentration for gas samples = mg/m^3, for liquid samples = mg/L, for solid samples = mg/kg. Fill in actual m^3, L, or kg value.

ORGANIC EXTRACT SUMMARY REPORT

Contractor	Battelle Columbus Laboratories		
Sample Site	EPA;RTP	**Sample Acquisition Date**	6-18-81
Type of Source	Air atomizing/automotive		
Test Number	E061881	**Sample ID Number**	DREA-BCL-DF18/29-E061881
Sample Description	Dilution filters #18 through 29.		
Original Sample Volume or Mass	116.8g		
Analyst Responsible	R. L. Barbour	**Date Analyzed**	7-24-81 **Time**
Calculations and Report Reviewed By	R. J. Jakobsen	**Report Date**	7-31-81

ORGANIC EXTRACT SUMMARY TABLE

Sample DREA-BCL-DF18/29-E061881

	LC1	LC2	LC3	LC4	LC5	LC6	LC7	Σ
Total Organics, mg	26.32	1.74	5.68	5.85	4.02	41.55	2.52	87.68
TCO, mg	--	--	0.05	--	0.18	0.41	0.44	1.08
GRAV, mg	26.32	1.74	5.63	5.85	3.84	41.14	2.08	86.80

Category — Assigned intensity – mg/m^3

Category								
Aliphatic hydrocarbon	100-0.34	100-0.02	100-0.07	100-0.08	100-0.05	100-0.54	100-0.03	1.13
Ester		10-0.002	10-0.01	10-0.01	10-0.005	10-0.05	10-0.003	0.08
Ether		10-0.002						0.002
Aromatic hydrocarbon		10-0.002			10-0.005	10-0.05	100-0.03	0.087
Lactone				10-0.01	10-0.005	10-0.05		0.065
Carboxylic acid					10-0.005	100-0.54	100-0.03	0.575
Alkylbenzenes						100-0.54	100-0.03	0.57
Alcohol						10-0.05		0.05
Acid salt							100-0.03	0.03

ORGANIC EXTRACT SUMMARY REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 6-25-81

Type of Source Air atomizing/truck

Test Number E062581 **Sample ID Number** DREA-BCL-XR/MR-E062581

Sample Description XAD-2 and organic module rinse.

Original Sample Volume or Mass 140g

Analyst Responsible R. L. Barbour **Date Analyzed** 7-24-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

ORGANIC EXTRACT SUMMARY TABLE

Sample DREA-BCL-XR/MR-E062581

	LC1	LC2	LC3	LC4	LC5	LC6	LC7	Σ
Total Organics, mg	2.44	0.02	2.74	4.02	3.29	16.90	6.40	35.81
TCO, mg	0.32	0.02	0.41	1.67	1.88	4.74	5.02	14.06
GRAV, mg	2.12	--	2.33	2.35	1.41	12.16	1.38	21.75

Assigned intensity – mg/m^3

Category								
Aliphatic hydrocarbon	100-0.08	100-0.001	100-0.09	100-0.14	10-0.01	100-0.58	10-0.02	0.921
Ester		10-ND	10-0.01	10-0.014	10-0.01	10-0.06	10-0.02	0.114
Lactone		10-ND			10-0.01	10-0.06		0.07
Aromatic hydrocarbon		10-ND	1-0.001	10-0.014	1-0.001	10-0.06	10-0.02	0.096
Olefin				10-0.014				0.014
Carboxylic acid				10-0.014	10-0.01	100-0.58	10-0.02	0.58
Acid salt							100-0.22	0.22
Primary amine salt						10-0.06		

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[1] Concentration for gas samples = mg/m^3, for liquid samples = mg/L, for solid samples = mg/kg. Fill in actual m^3, L, or kg value.

ORGANIC EXTRACT SUMMARY REPORT

Contractor Battelle Columbus Laboratories

Sample Site EPA;RTP **Sample Acquisition Date** 6-25-81

Type of Source Air atomizing/automotive

Test Number E062581 **Sample ID Number** DREA-BCL-DF31/42-E062581

Sample Description Dilution filters #31 through 42.

Original Sample Volume or Mass 148.6g

Analyst Responsible R. L. Barbour **Date Analyzed** 7-24-81 **Time**

Calculations and Report Reviewed By R. J. Jakobsen **Report Date** 7-31-81

ORGANIC EXTRACT SUMMARY TABLE

Sample DREA-BCL-DF13/42-E062581

	LC1	LC2	LC3	LC4	LC5	LC6	LC7	Σ
Total Organics, mg	36.84	2.43	6.90	9.03	5.07	54.88	2.22	117.37
TCO, mg	0.07	0.01	0.09	0.29	0.37	0.83	0.58	2.24
GRAV, mg	36.77	2.42	6.81	8.74	4.70	54.05	1.64	115.13

Category	Assigned intensity – mg/m^3							
Aliphatic hydrocarbon	100-0.32	100-0.02	100-0.06	100-0.08	100-0.04	100-0.47	100-0.02	1.01
Aromatic hydrocarbon	10-0.03	10-0.002	1-0.001	10-0.01	1-0.0004	10-0.05	10-0.002	0.0954
Ester		10-0.002	10-0.01	100-0.08	10-0.004	10-0.05	10-0.002	0.148
Carboxylic acid				100-0.08	10-0.004	100-0.47	100-0.02	0.574
Lactone				100-0.08	10-0.004	10-0.47		0.134
Alkylbenzenes						100-0.47	100-0.02	0.49
Aldehyde						10-0.05		0.05

APPENDIX B
INDUCTIVELY COUPLED ARGON PLASMA RESULTS

Metals by ICAP for Particulate Filters (Results Reported in $\mu g/m^3$).

	Vaporizing Burner		Air Atomizing Burner	
	Truck E050781	Automotive E052081	Automotive E061881	Truck E062581
Al	ND	4.25	100	50
B	9.44	11.69	92	22
Ba	9.44	13.02	280	280
Be	ND	ND	ND	ND
Ca	3.73	8.50	1,730	2,870
Cd	ND	0.56	37	41
Co	ND	ND	ND	ND
Cr	0.27	0.45	120	34
Cu	2.49	5.05	830	630
Fe	3.48	6.91	3,120	2,130
Mg	2.14	3.19	1,680	2,720
Mn	ND	2.18	290	79
Mo	ND	ND	230	75
Ni	ND	ND	29	19
P	47.22	98.34	11,000	18,200
Pb	62.13	792.03	50,200	15,300
Se	ND	ND	ND	ND
Sn	ND	6.64	160	100
Sr	ND	0.06	5.7	6.2
Ti	ND	ND	3.0	3.1
Tl	ND	ND	ND	ND
V	ND	ND	ND	ND
Y	ND	ND	ND	ND
Zn	131.72	82.39	23,100	31,100

ND = Not detected

Metals by ICAP for Dilution Filters.
(Results Reported in μg/m^3).

	Vaporizing Burner		Air Atomizing Burner	
	Truck E050781	Automotive E052081	Automotive E061881	Truck E062581
Al	22.18	9.76	210	200
B	14.46	4.71	130	140
Ba	52.07	16.15	250	590
Be	ND	ND	ND	ND
Ca	72.32	17.50	7,520	13,500
Cd	0.10	0.11	19	19
Co	0.67	0.32	4.8	3.2
Cr	0.28	0.17	65	27
Cu	3.47	1.48	390	350
Fe	14.46	10.09	2,000	1,500
Mg	23.14	4.37	2,380	4,920
Mn	0.57	0.54	140	45
Mo	ND	0.10	130	43
Ni	1.35	ND	12	11
P	158.13	44.41	8,950	17,400
Pb	37.60	143.33	19,000	8,150
Se	ND	ND	ND	ND
Sn	ND	1.01	78	51
Sr	0.52	0.16	24	31
Ti	0.78	0.34	4.5	5.0
Tl	ND	ND	ND	ND
V	ND	ND	ND	0.58
Y	ND	ND	ND	0.19
Zn	103.17	23.21	10,100	15,300

ND = Not detected

Metals by ICAP for Pot Residue
(Results Reported in μg/g).

	Vaporizing Burner Truck E050781	Air Atomizing Burner Automotive E052081
Al	500	600
B	1,380	570
Ba	260	1,800
Be	ND	ND
Ca	69,100	29,500
Cd	85	73
Co	ND	ND
Cr	170	200
Cu	1,350	1,250
Fe	7,950	8,160
Mg	25,900	9,600
Mn	210	520
Mo	110	480
Ni	ND	ND
P	74,300	30,600
Pb	21,600	96,300
Se	ND	ND
Sn	190	180
Sr	66	42
Ti	ND	ND
Tl	ND	ND
V	ND	ND
Y	ND	ND
Zn	66,100	37,400

ND = Not detected

Metals by ICAP for 1st Impingers and Condensates (Results Reported in $\mu g/m^3$).

	Vaporizing Burner		Air Atomizing Burner	
	Truck E050781	Automotive E052081	Automotive E061881	Truck E062581
Al	3.42	6.31	42	6.5
B	503.26	304.32	530	1,010
Ba	ND	ND	2.5	ND
Be	ND	ND	ND	ND
Ca	25.47	7.31	150	21
Cd	ND	ND	0.91	ND
Co	6.21	26.91	18	6.2
Cr	478.41	2,059.80	1,400	490
Cu	2.08	2.86	ND	ND
Fe	1,739.67	7,441.86	3,950	1,950
Mg	1.74	ND	91	2.0
Mn	45.05	190.70	110	52
Mo	33.86	136.21	170	47
Ni	341.72	1,574.75	1,050	390
P	17.40	19.27	75	13
Pb	ND	ND	32	5.5
Se	ND	ND	ND	ND
Sn	ND	173.42	ND	ND
Sr	0.15	ND	1.6	0.28
Ti	ND	0.96	ND	ND
Tl	ND	ND	ND	ND
V	1.24	5.98	3.0	1.0
Y	ND	ND	ND	ND
Zn	7.46	11.96	71	14

ND = Not detected

Metals by ICAP for 2nd and 3rd Impingers (Results Reported in $\mu g/m^3$).

	Vaporizing Burner		Air Atomizing Burner	
	Truck E050781	Automotive E052081	Automotive E061881	Truck E062581
Al	ND	ND	9.7	1.9
B	ND	ND	78	8.9
Ba	ND	ND	ND	ND
Be	ND	ND	ND	ND
Ca	5.90	3.22	30	8.9
Cd	ND	ND	ND	ND
Co	0.50	ND	7.1	ND
Cr	8.08	13.29	210	ND
Cu	0.47	ND	ND	ND
Fe	30.75	50.17	710	32
Mg	0.96	ND	16	ND
Mn	0.78	1.23	20	0.69
Mo	0.47	1.13	27	0.45
Ni	5.59	10.63	160	4.5
P	ND	ND	16	ND
Pb	ND	ND	14	ND
Se	ND	ND	ND	ND
Sn	ND	ND	ND	ND
Sr	ND	ND	0.21	ND
Ti	ND	ND	ND	ND
Tl	ND	ND	ND	ND
V	ND	ND	0.45	ND
Y	ND	ND	ND	ND
Zn	2.21	1.43	13	4.1

ND = Not detected

Metals by ICAP for Fuel Oils
(Results Reported in μg/g).

	Automotive	Truck
Al	23.0	6.2
B	18.0	23
Ba	29.0	48
Be	ND	ND
Ca	1040	860
Cd	2	1.1
Co	ND	ND
Cr	11	2.7
Cu	41	19
Fe	270	92
Mg	330	320
Mn	17	2.6
Mo	17	1.4
Ni	ND	ND
P	2000	1020
Pb	3320	290
Se	ND	ND
Sn	3.5	ND
Sr	ND	1.7
Ti	0.3	ND
Tl	ND	ND
V	ND	ND
Y	ND	ND
Zn	1130	940

ND = Not detected

VALUES USED IN MASS BALANCE FIGURES FOR
AIR ATOMIZING BURNER-AUTOMOTIVE (E061881)
(Results reported in μg of each element/
g of fuel burned)

Element	Fuel Oil	SASS Train	Dilution Filter
Al	23	4	6
B	18	12	3
Ba	29	8	7
Ca	1,040	73	202
Cd	2	1	0.5
Co	ND	0.4	1
Cr	11	30	2
Cu	41	15	11
Fe	270	140	54
Mg	330	43	64
Mn	17	8	4
Mo	17	8	3
Ni	ND	21	0.3
P	2,000	217	241
Pb	3,320	883	512
Se	ND	ND	ND
Sn	3.5	3	2
Sr	ND	0.3	0.6
Ti	0.3	0.5	0.1
V	ND	0.1	ND
Y	ND	ND	ND
Zn	1,130	406	272

ND = Not detected

VALUES USED IN MASS BALANCE FIGURES FOR AIR ATOMIZING BURNER-TRUCK (E062581)
(Results reported in μg of each element/g of fuel burned)

Element	Fuel Oil	SASS Train	Dilution Filter
Al	6	1	3
B	23	19	2
Ba	48	5	8
Ca	860	52	186
Cd	1	1	0.3
Co	ND	0.1	0.04
Cr	3	1	0.4
Cu	19	11	5
Fe	92	73	21
Mg	320	49	68
Mn	3	2	0.6
Mo	1	2	0.6
Ni	ND	7	0.2
P	1,020	324	240
Pb	290	272	112
Se	ND	ND	ND
Sn	ND	2	0.7
Sr	2	2	0.4
Ti	ND	0.1	0.1
V	ND	0.02	0.01
Y	ND	ND	0.003
Zn	940	554	211

ND = Not detected

VALUES USED IN MASS BALANCE FIGURES FOR VAPORIZING BURNER-TRUCK (E050781) (Results reported in µg of each element/ g of fuel burned)

Element	Fuel Oil	Pot Residue	SASS Train	Dilution Filter
Al	6	7	0.1	0.6
B	23	18	13	0.4
Ba	48	3	0.2	1
Ca	860	911	1	2
Cd	1	1	ND	0.003
Co	ND	ND	0.2	0.02
Cr	3	2	12	0.01
Cu	19	18	0.1	0.1
Fe	92	105	44	0.4
Mg	320	341	0.1	0.6
Mn	3	3	1	0.1
Mo	1	1	1	ND
Ni	ND	1	9	0.003
P	1,020	979	2	4
Pb	290	285	2	1
Se	ND	ND	0.4	ND
Sn	ND	3	0.1	ND
Sr	2	1	0.004	0.01
Ti	ND	ND	ND	0.02
V	ND	ND	ND	ND
Y	ND	ND	ND	ND
Zn	940	871	3	3

ND = Not detected

VALUES USED IN MASS BALANCE FIGURES FOR VAPORIZING BURNER-AUTOMOTIVE (E052081) (Results reported in μg of each element/ g of fuel burned)

Element	Fuel Oil	Pot Residue	SASS Train	Dilution Filter
Al	23	17	0.3	0.4
B	18	16	8	0.2
Ba	29	50	0.3	0.7
Ca	1,040	826	0.3	0.8
Cd	2	2	0.01	0.01
Co	ND	ND	0.7	0.02
Cr	11	6	50	0.01
Cu	41	35	0.2	0.1
Fe	270	229	180	0.5
Mg	330	269	0.1	0.2
Mn	17	15	5	0.02
Mo	17	13	3	0.01
Ni	ND	ND	0.3	ND
P	2,000	857	2	2.0
Pb	3,320	2,697	19	7
Se	ND	ND	ND	ND
Sn	3.5	5	4	0.1
Sr	ND	1	0.001	0.01
Ti	0.3	ND	0.02	0.02
V	ND	ND	ND	ND
Y	ND	ND	ND	ND
Zn	1,130	1,048	2	1.0

ND = Not detected

APPENDIX B
SPARK SOURCE MASS SPECTROMETRY RESULTS

SSMS ANALYSIS OF SASS SAMPLES

ACID BLANK #1

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAM/ML
Uranium	238	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E-3
Thorium	232	<5.00E-1	<6.00E-1	<5.00E-1	2.0	<1.00E-2
Bismuth	209	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E-3
Lead	208	1.00E+0	<1.00E+0	1.00E+0	1.0	1.00E-2
Thallium	205	<7.00E-1	<2.00E+0	<7.00E-1	2.0	<1.40E-2
Mercury	202	<2.00E+0	<2.00E+0	<2.00E+0	10.	<2.00E-1
Gold	197	<5.00E-1	NC	<5.00E-1	1.0	<5.01E-3
Platinum	195	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Iridium	193	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Osmium	190	<2.00E+0	NC	<2.00E+0	1.0	<2.00E-2
Rhenium	187	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Tungsten	184	<1.00E+0	<2.00E+0	<1.00E+0	1.0	<1.00E-2
Tantalum	181	<7.00E+0	<5.00E+0	<7.00E+0	1.0	<7.01E-2
Hafnium	178	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Lutecium	175	<5.00E-1	NC	<5.00E-1	1.0	<5.01E-3
Ytterbium	174	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Thulium	169	<5.00E-1	NC	<5.00E-1	1.0	<5.01E-3
Erbium	166	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Holmium	165	<5.00E-1	NC	<5.00E-1	1.0	<5.01E-3
Dysprosium	164	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Terbium	159	<3.00E-1	NC	<3.00E-1	1.0	<3.00E-3
Gadolinium	158	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Europium	153	<7.00E-1	NC	<7.00E-1	1.0	<7.01E-3
Samarium	152	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Neodymium	144	<3.00E+0	NC	<3.00E+0	1.0	<3.00E-2
Praseodymium	141	<3.00E-1	NC	<3.00E-1	1.0	<3.00E-3
Cerium	140	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<1.50E-3
Lanthanum	139	<3.00E-1	NC	<3.00E-1	1.0	<3.00E-3
Barium	137	5.00E+1	<6.00E-1	5.00E+1	1.0	5.01E-1
Cesium	133	<3.00E-1	<3.00E-1	<3.00E-1	0.1	<4.50E-4
Iodine	127	<3.00E-1	1.00E+0	<3.00E-1	1.5	<4.50E-3
Tellurium	128	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<1.00E-2
Antimony	121	<5.00E-1	<6.00E-1	<5.00E-1	0.6	<3.00E-3
Tin	118	3.00E+0	<1.00E+0	3.00E+0	1.0	3.00E-2
Indium	115	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<1.50E-3
Cadmium	114	<1.00E+0	<1.00E+0	<1.00E+0	3.0	<3.00E-2
Silver	107	<5.00E-1	<5.00E-1	<5.00E-1	0.3	<1.50E-3
Palladium	105	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Rhodium	103	<3.00E-1	NC	<3.00E-1	1.0	<3.00E-3
Ruthenium	101	<7.00E-1	NC	<7.00E-1	1.0	<7.01E-3
Molybdenum	98	<1.00E+0	<1.00E+0	<1.00E+0	0.5	<5.01E-3
Niobium	93	<3.00E-1	<3.00E-1	<3.00E-1	1.0	<3.00E-3
Zirconium	90	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E-3
Yttrium	89	<2.00E-1	NC	<2.00E-1	1.0	<2.00E-3
Strontium	86	2.00E-1	<2.00E-1	2.00E-1	0.2	4.00E-4
Rubidium	85	<3.00E-1	<3.00E-1	<3.00E-1	0.2	<6.01E-4
Bromine	79	<3.00E-1	<5.00E-1	<3.00E-1	2.5	<7.51E-3
Selenium	80	<5.00E-1	7.00E+0	<5.00E-1	0.7	<3.50E-3
Arsenic	75	<2.00E-1	<2.00E-1	<2.00E-1	0.5	<1.00E-3
Germanium	72	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E-3
Gallium	71	<5.00E-1	<4.00E-1	<5.00E-1	0.5	<2.50E-3
Zinc	66	1.00E+1	<5.00E-1	1.00E+1	1.0	1.00E-1

SSMS ANALYSIS OF SASS SAMPLES
ACID BLANK #1

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAM/ML	
Copper	63	5.00E+0	<1.00E+0	5.00E+0	0.5	2.50E-2	
Nickel	58	7.00E+0	<3.00E-1	7.00E+0	0.5	3.50E-2	
Cobalt	59	1.00E-1	<2.00E-1	1.00E-1	0.5	5.01E-4	
Iron	57	5.00E+1	1.00E+0	4.90E+1	0.3	1.47E-1	
Manganese	55	1.00E+0	1.50E-1	8.50E-1	0.3	2.55E-3	
Chromium	53	5.00E-1	<1.50E-1	5.00E-1	0.3	1.50E-3	
Vanadium	51	5.00E-1	<1.50E-1	5.00E-1	0.3	1.50E-3	
Titanium	47	<2.00E+0	<4.00E-1	<2.00E+0	0.5	<1.00E-2	
Scandium	45	<2.00E-1	NC	<2.00E-1	1.0	<2.00E-3	
Calcium	43	1.00E+2	1.00E+0	9.90E+1	0.5	4.95E-1	
Potassium	41	2.50E+2	3.00E-1	2.50E+2	0.1	2.50E-1	
Chlorine	35	1.00E+2	3.00E+0	9.70E+1	1.0	9.71E-1	
Sulphur	33	7.00E+1	NC	7.00E+1	1.0	7.01E-1	
Phosphorus	31/2	5.00E+0	<1.00E-1	5.00E+0	0.4	2.00E-2	
Silicon	29/2	2.50E+2	5.00E+1	2.00E+2	0.3	6.01E-1	
Aluminum	27/2	1.00E+3	1.00E+1	9.90E+2	0.3	2.97E+0	
Magnesium	25/2	5.00E+1	<6.00E-1	5.00E+1	0.1	5.01E-2	
Sodium	23/2	2.00E+2	2.00E+0	1.98E+2	0.3	5.95E-1	
Fluorine	19	<1.00E+0	<2.00E-1	<1.00E+0	2.0	<2.00E-2	
Boron	10	1.00E+1	1.50E-1	9.85E+0	0.3	2.96E-2	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	5.00E-1	<1.50E-2	5.00E-1	0.3	1.50E-3	

TOTALS: 7.54E+0
<6.30E-1

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION.

RW=1.00E-01 TV=1.00E+00 AV=1.00E+01 F=1.00E+00 NF=1.00E+00
TW=1.00E+00 AW=1.00E+00 M3=1.00E+00

SSMS ANALYSIS OF SASS SAMPLES
ACID BLANK#2

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAM/ML
Uranium	238	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E-3
Thorium	232	<5.00E-1	<6.00E-1	<5.00E-1	2.0	<1.00E-2
Bismuth	209	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E-3
Lead	208	1.00E+0	<1.00E+0	1.00E+0	1.0	1.00E-2
Thallium	205	<7.00E-1	<2.00E+0	<7.00E-1	2.0	<1.40E-2
Mercury	202	<2.00E+0	<2.00E+0	<2.00E+0	10.	<2.00E-1
Gold	197	<5.00E-1	NC	<5.00E-1	1.0	<5.01E-3
Platinum	195	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Iridium	193	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Osmium	190	<2.00E+0	NC	<2.00E+0	1.0	<2.00E-2
Rhenium	187	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Tungsten	184	<1.00E+0	<2.00E+0	<1.00E+0	1.0	<1.00E-2
Tantalum	181	<7.00E+0	<5.00E+0	<7.00E+0	1.0	<7.01E-2
Hafnium	178	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Lutecium	175	<5.00E-1	NC	<5.00E-1	1.0	<5.01E-3
Ytterbium	174	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Thulium	169	<5.00E-1	NC	<5.00E-1	1.0	<5.01E-3
Erbium	166	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Holmium	165	<5.00E-1	NC	<5.00E-1	1.0	<5.01E-3
Dysprosium	164	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Terbium	159	<3.00E-1	NC	<3.00E-1	1.0	<3.00E-3
Gadolinium	158	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Europium	153	<7.00E-1	NC	<7.00E-1	1.0	<7.01E-3
Samarium	152	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Neodymium	144	<3.00E+0	NC	<3.00E+0	1.0	<3.00E-2
Praseodymium	141	<3.00E-1	NC	<3.00E-1	1.0	<3.00E-3
Cerium	140	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<1.50E-3
Lanthanum	139	<3.00E-1	NC	<3.00E-1	1.0	<3.00E-3
Barium	137	5.00E+0	<6.00E-1	5.00E+0	1.0	5.01E-2
Cesium	133	<3.00E-1	<3.00E-1	<3.00E-1	0.1	<4.50E-4
Iodine	127	<3.00E-1	1.00E+0	<3.00E-1	1.5	<4.50E-3
Tellurium	128	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<1.00E-2
Antimony	121	<5.00E-1	<6.00E-1	<5.00E-1	0.6	<3.00E-3
Tin	118	3.00E+0	<1.00E+0	3.00E+0	1.0	3.00E-2
Indium	115	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<1.50E-3
Cadmium	114	<1.00E+0	<1.00E+0	<1.00E+0	3.0	<3.00E-2
Silver	107	<5.00E-1	<5.00E-1	<5.00E-1	0.3	<1.50E-3
Palladium	105	<1.00E+0	NC	<1.00E+0	1.0	<1.00E-2
Rhodium	103	<3.00E-1	NC	<3.00E-1	1.0	<3.00E-3
Ruthenium	101	<7.00E-1	NC	<7.00E-1	1.0	<7.01E-3
Molybdenum	98	<1.00E+0	<1.00E+0	<1.00E+0	0.5	<5.01E-3
Niobium	93	<2.00E+0	<3.00E-1	<2.00E+0	1.0	<2.00E-2
Zirconium	90	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E-3
Yttrium	89	<2.00E-1	NC	<2.00E-1	1.0	<2.00E-3
Strontium	86	2.00E-1	<2.00E-1	2.00E-1	0.2	4.00E-4
Rubidium	85	<3.00E-1	<3.00E-1	<3.00E-1	0.2	<6.01E-4
Bromine	79	<3.00E-1	<5.00E-1	<3.00E-1	2.5	<7.51E-3
Selenium	80	<5.00E-1	7.00E+0	<5.00E-1	0.7	<3.50E-3
Arsenic	75	<2.00E-1	<2.00E-1	<2.00E-1	0.5	<1.00E-3
Germanium	72	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E-3
Gallium	71	<5.00E-1	<4.00E-1	<5.00E-1	0.5	<2.50E-3
Zinc	66	5.00E+0	<5.00E-1	5.00E+0	1.0	5.01E-2

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SSMS ANALYSIS OF SASS SAMPLES
ACID BLANK#2

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAM/ML	
Copper	63	5.00E+0	<1.00E+0	5.00E+0	0.5	2.50E-2	
Nickel	58	7.00E+0	<3.00E-1	7.00E+0	0.5	3.50E-2	
Cobalt	59	1.00E-1	<2.00E-1	1.00E-1	0.5	5.01E-4	
Iron	57	5.00E+1	1.00E+0	4.90E+1	0.3	1.47E-1	
Manganese	55	1.00E+0	1.50E-1	8.50E-1	0.3	2.55E-3	
Chromium	53	1.00E+0	<1.50E-1	1.00E+0	0.3	3.00E-3	
Vanadium	51	5.00E-1	<1.50E-1	5.00E-1	0.3	1.50E-3	
Titanium	47	<2.00E+0	<4.00E-1	<2.00E+0	0.5	<1.00E-2	
Scandium	45	<2.00E+0	NC	<2.00E+0	1.0	<2.00E-2	
Calcium	43	2.00E+2	1.00E+0	1.99E+2	0.5	1.00E+0	
Potassium	41	1.50E+2	3.00E-1	1.50E+2	0.1	1.50E-1	
Chlorine	35	5.00E+1	3.00E+0	4.70E+1	1.0	4.70E-1	
Sulphur	33	7.00E+1	NC	7.00E+1	1.0	7.01E-1	
Phosphorus	31/2	5.00E+0	<1.00E-1	5.00E+0	0.4	2.00E-2	
Silicon	29/2	2.50E+2	5.00E+1	2.00E+2	0.3	6.01E-1	
Aluminum	27/2	5.00E+2	1.00E+1	4.90E+2	0.3	1.47E+0	
Magnesium	25/2	5.00E+1	<6.00E-1	5.00E+1	0.1	5.01E-2	
Sodium	23/2	2.00E+2	2.00E+0	1.98E+2	0.3	5.95E-1	
Fluorine	19	<1.00E+0	<2.00E-1	<1.00E+0	2.0	<2.00E-2	
Boron	10	5.00E+0	1.50E-1	4.85E+0	0.3	1.46E-2	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	2.00E+0	<1.50E-2	2.00E+0	0.3	6.01E-3	
					TOTALS:	5.43E+0 <6.65E-1	

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION

RW=1.00E-01 TV=1.00E+00 AV=1.00E+01 F=1.00E+00 NF=1.00E+00
TW=1.00E+00 AW=1.00E+00 M3=1.00E+00

SSMS ANALYSIS OF SASS SAMPLES
IMPINGER BLANK (1000 ML) E050781-HIB(#383)

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	TOTAL UGRAMS
Uranium	238	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E+0
Thorium	232	<5.00E-1	<6.00E-1	<5.00E-1	2.0	<1.00E+1
Bismuth	209	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E+0
Lead	208	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<1.00E+1
Thallium	205	<7.00E-1	<2.00E+0	<7.00E-1	2.0	<1.40E+1
Mercury	202	<2.00E+0	<2.00E+0	<2.00E+0	10.	<2.00E+2
Gold	197	<5.00E-1	NC	<5.00E-1	1.0	<5.01E+0
Platinum	195	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+1
Iridium	193	<1.00E+0	NC	<1.00E-0	1.0	<1.00E+1
Osmium	190	<2.00E+0	NC	<2.00E+0	1.0	<2.00E+1
Rhenium	187	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+1
Tungsten	184	<1.00E+0	<2.00E+0	<1.00E-0	1.0	<1.00E+1
Tantalum	181	<7.00E+0	<5.00E+0	<7.00E+0	1.0	<7.01E+1
Hafnium	178	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+1
Lutecium	175	<5.00E-1	NC	<5.00E-1	1.0	<5.01E+0
Ytterbium	174	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+1
Thulium	169	<5.00E-1	NC	<5.00E-1	1.0	<5.01E+0
Erbium	166	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+1
Holmium	165	<5.00E-1	NC	<5.00E-1	1.0	<5.01E+0
Dysprosium	164	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+1
Terbium	159	<3.00E-1	NC	<3.00E-1	1.0	<3.00E+0
Gadolinium	158	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+1
Europium	153	<7.00E-1	NC	<7.00E-1	1.0	<7.01E+0
Samarium	152	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+1
Neodymium	144	<3.00E+0	NC	<3.00E+0	1.0	<3.00E+1
Praseodymium	141	<3.00E-1	NC	<3.00E-1	1.0	<3.00E+0
Cerium	140	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<1.50E+0
Lanthanum	139	<3.00E-1	NC	<3.00E-1	1.0	<3.00E+0
Barium	137	5.00E-1	<6.00E-1	5.00E-1	1.0	5.01E+0
Cesium	133	<3.00E-1	<3.00E-1	<3.00E-1	0.1	<4.50E-1
Iodine	127	<3.00E-1	1.00E+0	<3.00E-1	1.5	<4.50E+0
Tellurium	128	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<1.00E+1
Antimony	121	<5.00E-1	<6.00E-1	<5.00E-1	0.6	<3.00E+0
Tin	118	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<1.00E+1
Indium	115	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<1.50E+0
Cadmium	114	<1.00E+0	<1.00E+0	<1.00E+0	3.0	<3.00E+1
Silver	107	<5.00E-1	<5.00E-1	<5.00E-1	0.3	<1.50E+0
Palladium	105	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+1
Rhodium	103	<3.00E-1	NC	<3.00E-1	1.0	<3.00E+0
Ruthenium	101	<7.00E-1	NC	<7.00E-1	1.0	<7.01E+0
Molybdenum	98	2.00E+0	<1.00E-0	2.00E+0	0.5	1.00E+1
Niobium	93	<2.00E+0	<3.00E-1	<2.00E+0	1.0	<2.00E+1
Zirconium	90	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E+0
Yttrium	89	<2.00E-1	NC	<2.00E-1	1.0	<2.00E+0
Strontium	86	2.00E-1	<2.00E-1	2.00E-1	0.2	4.00E-1
Rubidium	85	<3.00E-1	<3.00E-1	<3.00E-1	0.2	<6.01E-1
Bromine	79	1.00E+0	<5.00E-1	1.00E+0	2.5	2.50E+1
Selenium	80	<5.00E-1	7.00E+0	<5.00E-1	0.7	<3.50E+0
Arsenic	75	2.00E-1	<2.00E-1	2.00E-1	0.5	1.00E+0
Germanium	72	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E+0
Gallium	71	<1.00E+0	<4.00E-1	<1.00E+0	0.5	<5.01E+0
Zinc	66	5.00E+0	<5.00E-1	5.00E+0	1.0	5.01E+1

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SSMS ANALYSIS OF SASS SAMPLES
IMPINGER BLANK (1000 ML) E050781-HIB(#383)

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	TOTAL UGRAMS	
Copper	63	2.00E+0	<1.00E+0	2.00E+0	0.5	1.00E+1	
Nickel	58	2.00E+0	<3.00E-1	2.00E+0	0.5	1.00E+1	
Cobalt	59	1.00E+0	<2.00E-1	1.00E+0	0.5	5.01E+0	
Iron	57	1.00E+1	1.00E+0	9.00E+0	0.3	2.70E+1	
Manganese	55	1.00E-1	1.50E-1	<5.00E-2	0.3	<1.50E-1	
Chromium	53	5.00E-1	<1.50E-1	5.00E-1	0.3	1.50E+0	
Vanadium	51	1.00E-1	<1.50E-1	1.00E-1	0.3	3.00E-1	
Titanium	47	1.00E+0	<4.00E-1	1.00E+0	0.5	5.01E+0	
Scandium	45	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+1	
Calcium	43	2.00E+1	1.00E+0	1.90E+1	0.5	9.51E+1	
Potassium	41	1.00E+2	3.00E-1	9.97E+1	0.1	9.98E+1	
Chlorine	35	7.00E+0	3.00E+0	4.00E+0	1.0	4.00E+1	
Sulphur	33	7.00E+1	NC	7.00E+1	1.0	7.01E+2	
Phosphorus	31/2	3.00E+0	<1.00E-1	3.00E+0	0.4	1.20E+1	
Silicon	29/2	2.00E+1	5.00E+1	<3.00E+1	0.3	<9.01E+1	
Aluminum	27/2	5.00E+1	1.00E+1	4.00E+1	0.3	1.20E+2	
Magnesium	25/2	<2.00E+0	<6.00E-1	<2.00E+0	0.1	<2.00E+0	
Sodium	23/2	2.00E+2	2.00E+0	1.98E+2	0.3	5.95E+2	
Fluorine	19	<1.50E+1	<2.00E-1	<1.50E+1	2.0	<3.00E+2	
Boron	10	2.00E-1	1.50E-1	5.00E-2	0.3	1.50E-1	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	<2.00E+0	<1.50E-2	<2.00E+0	0.3	<6.01E+0	
					TOTALS:	1.81E+3	
						<1.03E+3	

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION

RW=1.00E-01 TV=1.00E+03 AV=1.00E+01 F=1.00E+00 NF=1.00E+00

SSMS ANALYSIS OF SASS SAMPLES
FILTER BLANK E050781-PFB(#373)

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	TOTAL UGRAMS
Uranium	238	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<4.00E+0
Thorium	232	<5.00E-1	<6.00E-1	<5.00E-1	2.0	<8.01E+0
Bismuth	209	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<4.00E+0
Lead	208	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<8.01E+0
Thallium	205	<7.00E-1	<2.00E+0	<7.00E-1	2.0	<1.12E+1
Mercury	202	<2.00E+0	<2.00E+0	<2.00E+0	10.	<1.60E+2
Gold	197	<5.00E-1	NC	<5.00E-1	1.0	<4.00E+0
Platinum	195	<1.00E+0	NC	<1.00E+0	1.0	<8.01E+0
Iridium	193	<1.00E+0	NC	<1.00E+0	1.0	<8.01E+0
Osmium	190	<2.00E+0	NC	<2.00E+0	1.0	<1.60E+1
Rhenium	187	<1.00E+0	NC	<1.00E+0	1.0	<8.01E+0
Tungsten	184	<1.00E+0	<2.00E+0	<1.00E+0	1.0	<8.01E+0
Tantalum	181	<1.00E+1	<5.00E+0	<1.00E+1	1.0	<8.01E+1
Hafnium	178	<1.00E+0	NC	<1.00E+0	1.0	<8.01E+0
Lutecium	175	<5.00E-1	NC	<5.00E-1	1.0	<4.00E+0
Ytterbium	174	<1.00E+0	NC	<1.00E+0	1.0	<8.01E+0
Thulium	169	<5.00E-1	NC	<5.00E-1	1.0	<4.00E+0
Erbium	166	<1.00E+0	NC	<1.00E+0	1.0	<8.01E+0
Holmium	165	<5.00E-1	NC	<5.00E-1	1.0	<4.00E+0
Dysprosium	164	<1.00E+0	NC	<1.00E+0	1.0	<8.01E+0
Terbium	159	<3.00E-1	NC	<3.00E-1	1.0	<2.40E+0
Gadolinium	158	<1.00E+0	NC	<1.00E+0	1.0	<8.01E+0
Europium	153	<7.00E-1	NC	<7.00E-1	1.0	<5.61E+0
Samarium	152	<1.00E+0	NC	<1.00E+0	1.0	<8.01E+0
Neodymium	144	<3.00E+0	NC	<3.00E+0	1.0	<2.40E+1
Praseodymium	141	<3.00E-1	NC	<3.00E-1	1.0	<2.40E+0
Cerium	140	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<1.20E+0
Lanthanum	139	<3.00E-1	NC	<3.00E-1	1.0	<2.40E+0
Barium	137	1.00E+2	<6.00E-1	1.00E+2	1.0	8.01E+2
Cesium	133	<3.00E-1	<3.00E-1	<3.00E-1	0.1	<3.60E-1
Iodine	127	<3.00E-1	1.00E+0	<3.00E-1	1.5	<3.60E+0
Tellurium	128	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<8.01E+0
Antimony	121	<5.00E-1	<6.00E-1	<5.00E-1	0.6	<2.40E+0
Tin	118	3.00E+0	<1.00E+0	3.00E+0	1.0	2.40E+1
Indium	115	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<1.20E+0
Cadmium	114	<1.00E+0	<1.00E+0	<1.00E+0	3.0	<2.40E+1
Silver	107	<5.00E-1	<5.00E-1	<5.00E-1	0.3	<1.20E+0
Palladium	105	<1.00E+0	NC	<1.00E+0	1.0	<8.01E+0
Rhodium	103	<3.00E-1	NC	<3.00E-1	1.0	<2.40E+0
Ruthenium	101	<7.00E-1	NC	<7.00E-1	1.0	<5.61E+0
Molybdenum	98	<1.00E+0	<1.00E+0	<1.00E+0	0.5	<4.00E+0
Niobium	93	<2.00E+0	<3.00E-1	<2.00E+0	1.0	<1.60E+1
Zirconium	90	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<4.00E+0
Yttrium	89	<2.00E-1	NC	<2.00E-1	1.0	<1.60E+0
Strontium	86	7.00E-1	<2.00E-1	7.00E-1	0.2	1.12E+0
Rubidium	85	<3.00E-1	<3.00E-1	<3.00E-1	0.2	<4.80E-1
Bromine	79	5.00E-1	<5.00E-1	5.00E-1	2.5	1.00E+1
Selenium	80	<5.00E-1	7.00E+0	<5.00E-1	0.7	<2.80E+0
Arsenic	75	<2.00E-1	<2.00E-1	<2.00E-1	0.5	<8.01E-1
Germanium	72	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<4.00E+0
Gallium	71	1.00E+0	<4.00E-1	1.00E+0	0.5	4.00E+0
Zinc	66	1.00E+1	<5.00E-1	1.00E+1	1.0	8.01E+1

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SSMS ANALYSIS OF SPSS SAMPLES
FILTER BLANK E050781-PFB(#373)

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	TOTAL UGRAMS	
Copper	63	3.00E+0	<1.00E+0	3.00E+0	0.5	1.20E+1	
Nickel	58	7.00E+0	<3.00E-1	7.00E+0	0.5	2.80E+1	
Cobalt	59	1.00E+0	<2.00E-1	1.00E+0	0.5	4.00E+0	
Iron	57	7.00E+1	1.00E+0	6.90E+1	0.3	1.66E+2	
Manganese	55	1.00E+0	1.50E-1	8.50E-1	0.3	2.04E+0	
Chromium	53	5.00E+0	<1.50E-1	5.00E+0	0.3	1.20E+1	
Vanadium	51	1.00E-1	<1.50E-1	1.00E-1	0.3	2.40E-1	
Titanium	47	5.00E+0	<4.00E-1	5.00E+0	0.5	2.00E+1	
Scandium	45	<1.00E+0	NC	<1.00E+0	1.0	<8.01E+0	
Calcium	43	2.00E+2	1.00E+0	1.99E+2	0.5	7.97E+2	
Potassium	41	2.50E+2	3.00E-1	2.50E+2	0.1	2.00E+2	
Chlorine	35	5.00E+1	3.00E-0	4.70E+1	1.0	3.76E+2	
Sulphur	33	7.00E+2	NC	7.00E+2	1.0	5.61E+3	
Phosphorus	31/2	3.00E+0	<1.00E-1	3.00E+0	0.4	9.61E+0	
Silicon	29/2	1.00E+3	5.00E+1	9.50E+2	0.3	2.28E+3	
Aluminum	27/2	2.00E+2	1.00E+1	1.90E+2	0.3	4.56E+2	
Magnesium	25/2	7.00E+1	<6.00E-1	7.00E+1	0.1	5.61E+1	
Sodium	23/2	1.00E+3	2.00E+0	9.98E+2	0.3	2.40E+3	
Fluorine	19	<3.00E+0	<2.00E-1	<3.00E+0	2.0	<4.80E+1	
Boron	10	1.00E+1	1.50E-1	9.85E+0	0.3	2.37E+1	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	3.00E+0	<1.50E-2	3.00E-0	0.3	7.21E+0	
					TOTALS:	1.34E+4 <5.72E+2	

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION

RW=1.00E-01 TV=1.00E+02 AV=1.00E+01 F=1.25E-01 NF=1.00E+00

SSMS ANALYSIS OF SASS SAMPLES
RESIN BLANK E050781-XR3(#372)

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	TOTAL UGRAMS
Uranium	238	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E-1
Thorium	232	<5.00E-1	<6.00E-1	<5.00E-1	2.0	<1.00E+0
Bismuth	209	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E-1
Lead	208	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<1.00E+0
Thellium	205	<7.00E-1	<2.00E+0	<7.00E-1	2.0	<1.40E+0
Mercury	202	<2.00E+0	<2.00E+0	<2.00E+0	10.	<2.00E+1
Gold	197	<5.00E-1	NC	<5.00E-1	1.0	<5.01E-1
Platinum	195	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+0
Iridium	193	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+0
Osmium	190	<2.00E+0	NC	<2.00E+0	1.0	<2.00E+0
Rhenium	187	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+0
Tungsten	184	<1.00E+0	<2.00E+0	<1.00E+0	1.0	<1.00E+0
Tantalum	181	<1.00E+1	<5.00E+0	<1.00E+1	1.0	<1.00E+1
Hafnium	178	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+0
Lutecium	175	<5.00E-1	NC	<5.00E-1	1.0	<5.01E-1
Ytterbium	174	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+0
Thulium	169	<5.00E-1	NC	<5.00E-1	1.0	<5.01E-1
Erbium	166	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+0
Holmium	165	<5.00E-1	NC	<5.00E-1	1.0	<5.01E-1
Dysprosium	164	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+0
Terbium	159	<3.00E-1	NC	<3.00E-1	1.0	<3.00E-1
Gadolinium	158	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+0
Europium	153	<7.00E-1	NC	<7.00E-1	1.0	<7.01E-1
Samarium	152	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+0
Neodymium	144	<3.00E+0	NC	<3.00E+0	1.0	<3.00E+0
Praseodymium	141	<3.00E-1	NC	<3.00E-1	1.0	<3.00E-1
Cerium	140	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<1.50E-1
Lanthanum	139	<3.00E-1	NC	<3.00E-1	1.0	<3.00E-1
Barium	137	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E-1
Cesium	133	<3.00E-1	<3.00E-1	<3.00E-1	0.1	<4.50E-2
Iodine	127	<3.00E-1	1.00E+0	<3.00E-1	1.5	<4.50E-1
Tellurium	128	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<1.00E+0
Antimony	121	<5.00E-1	<6.00E-1	<5.00E-1	0.6	<3.00E-1
Tin	118	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<1.00E+0
Indium	115	<7.00E-1	<3.00E-1	<3.00E-1	0.5	<1.50E-1
Cadmium	114	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<1.00E+0
Silver	107	<5.00E-1	<5.00E-1	<5.00E-1	0.3	<1.50E-1
Palladium	105	<1.00E+0	NC	<1.00E+0	1.0	<1.00E+0
Rhodium	103	<3.00E-1	NC	<3.00E-1	1.0	<3.00E-1
Ruthenium	101	<7.00E-1	NC	<7.00E-1	1.0	<7.01E-1
Molybdenum	98	3.00E+0	<1.00E+0	3.00E+0	0.5	1.50E+0
Niobium	93	<7.00E-1	<3.00E-1	<7.00E-1	1.0	<7.01E-1
Zirconium	90	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E-1
Yttrium	89	<2.00E-1	NC	<2.00E-1	1.0	<2.00E-1
Strontium	86	<2.00E-1	<2.00E-1	<2.00E-1	0.2	<4.00E-2
Rubidium	85	<3.00E-1	<3.00E-1	<3.00E-1	0.1	<3.01E-2
Bromine	79	<5.00E-1	<5.00E-1	<5.00E-1	2.5	<1.25E+0
Selenium	80	<5.00E-1	7.00E-0	<5.00E-1	0.7	<3.50E-1
Arsenic	75	<2.00E-1	<2.00E-1	<2.00E-1	0.5	<1.00E-1
Germanium	72	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.01E-1
Gallium	71	<5.00E-1	<4.00E-1	<5.00E-1	0.5	<2.50E-1
Zinc	66	1.00E+1	<5.00E+0	1.00E+1	1.0	1.00E+1

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SSMS ANALYSIS OF SASS SAMPLES
RESIN BLANK E050781-XRB(#372)

             LINE USED  UNCORRECTED               CORRECTED
                FOR       SAMPLE       BLANK       SAMPLE
  ELEMENT    ESTIMATE      VALUE       VALUE        VALUE     RSC  TOTAL UGRAMS

Copper          63        5.00E+0    <1.00E-0     5.00E+0    0.5    2.50E+0
Nickel          58        7.00E+1    <3.00E-1     7.00E+1    0.5    3.50E+1
Cobalt          59        1.00E-0    <2.00E-1     1.00E-0    0.5    5.01E-1
Iron            57        7.00E+1     1.00E-0     6.90E+1    0.3    2.07E+1
Manganese       55        7.00E-1     1.50E-1     5.50E-1    0.3    1.65E-1
Chromium        53        1.00E+1    <1.50E-1     1.00E+1    0.3    3.00E+0
Vanadium        51        1.00E-1    <1.50E-1     1.00E-1    0.3    3.00E-2
Titanium        47        5.00E+0    <4.00E-1     5.00E+0    0.5    2.50E+0
Scandium        45       <1.00E+0     NC         <1.00E+0    1.0    1.00E+0
Calcium         43        1.00E+2     1.00E+0     9.90E+1    0.5    4.95E+1
Potassium       41        5.00E+1     3.00E-1     4.97E+1    0.1    4.97E+0
Chlorine        35        1.50E+1     3.00E+0     1.20E+1    1.0    1.20E+1
Sulphur         33        1.50E+2     NC          1.50E+2    1.0    1.50E+2
Phosphorus      31/2      5.00E+0    <1.00E-1     5.00E+0    0.4    2.00E+0
Silicon         29/2      1.00E+4     5.00E-1     9.99E+3    0.3    2.99E+3
Aluminum        27/2      5.00E+2     1.00E-1     4.90E+2    0.3    1.47E+2
Magnesium       25/2      2.00E+2    <6.00E-1     2.00E+2    0.1    2.00E+1
Sodium          23/2      3.00E+2     2.00E+0     2.98E+2    0.3    8.95E+1
Fluorine        19       <1.00E+0    <2.00E-1    <1.00E+0    2.0   <2.00E+0
Boron           10        3.00E+0     1.50E-1     2.85E+0    0.3    8.56E-1
Beryllium        9        NC         <3.00E-2     NC         0.5    NC        A
Lithium          7        6.00E+0    <1.50E-2     6.00E+0    0.3    1.80E+0

                                                      TOTALS:  3.54E+3
                                                              <6.88E+1

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION

RW=1.00E-01  TV=1.00E+02  AV=1.00E+01  F=1.00E-00  NF=1.00E-00
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SSMS ANALYSIS OF SASS SAMPLES
DILUTION FILTER BLANK   E050781-DFB(#374)

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	TOTAL UGRAMS
Uranium	238	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<4.06E+0
Thorium	232	<5.00E-1	<6.00E-1	<5.00E-1	2.0	<8.12E+0
Bismuth	209	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<4.06E+0
Lead	208	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<8.12E+0
Thallium	205	<7.00E-1	<2.00E+0	<7.00E-1	2.0	<1.14E+1
Mercury	202	<2.00E+0	<2.00E+0	<2.00E+0	10.	<1.62E+2
Gold	197	<5.00E-1	NC	<5.00E-1	1.0	<4.06E+0
Platinum	195	<1.00E+0	NC	<1.00E+0	1.0	<8.12E+0
Iridium	193	<1.00E+0	NC	<1.00E+0	1.0	<8.12E+0
Osmium	190	<2.00E+0	NC	<2.00E+0	1.0	<1.62E+1
Rhenium	187	<1.00E+0	NC	<1.00E+0	1.0	<8.12E+0
Tungsten	184	<1.00E+0	<2.00E+0	<1.00E+0	1.0	<8.12E+0
Tantalum	181	<3.00E+0	<5.00E+0	<3.00E+0	1.0	<2.44E+1
Hafnium	178	<1.00E+0	NC	<1.00E+0	1.0	<8.12E+0
Lutecium	175	<5.00E-1	NC	<5.00E-1	1.0	<4.06E+0
Ytterbium	174	<1.00E+0	NC	<1.00E+0	1.0	<8.12E+0
Thulium	169	<5.00E-1	NC	<5.00E-1	1.0	<4.06E+0
Erbium	166	<1.00E+0	NC	<1.00E+0	1.0	<8.12E+0
Holmium	165	<5.00E-1	NC	<5.00E-1	1.0	<4.06E+0
Dysprosium	164	<1.00E+0	NC	<1.00E+0	1.0	<8.12E+0
Terbium	159	<3.00E+0	NC	<3.00E+0	1.0	<2.44E+1
Gadolinium	158	<1.00E+0	NC	<1.00E+0	1.0	<8.12E+0
Europium	153	<7.00E-1	NC	<7.00E-1	1.0	<5.68E+0
Samarium	152	<1.00E+0	NC	<1.00E+0	1.0	<8.12E+0
Neodymium	144	<3.00E+0	NC	<3.00E-0	1.0	<2.44E+1
Praseodymium	141	<3.00E-1	NC	<3.00E-1	1.0	<2.44E+0
Cerium	140	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<1.22E+0
Lanthanum	139	<3.00E-1	NC	<3.00E-1	1.0	<2.44E+0
Barium	137	2.00E+2	<6.00E-1	2.00E-2	1.0	1.62E+3
Cesium	133	<3.00E-1	<3.00E-1	<3.00E-1	0.1	<3.65E-1
Iodine	127	<3.00E-1	1.00E+0	<3.00E-1	1.5	<3.65E+0
Tellurium	128	<1.00E+0	<1.00E+0	<1.00E-0	1.0	<8.12E+0
Antimony	121	<5.00E-1	<6.00E-1	<5.00E-1	0.6	<2.44E+0
Tin	118	2.00E+0	<1.00E+0	2.00E+0	1.0	1.62E+1
Indium	115	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<1.22E+0
Cadmium	114	<1.00E+0	<1.00E+0	<1.00E+0	3.0	<2.44E+1
Silver	107	<5.00E-1	<5.00E-1	<5.00E-1	0.3	<1.22E+0
Palladium	105	<1.00E+0	NC	<1.00E+0	1.0	<8.12E+0
Rhodium	103	<3.00E-1	NC	<3.00E-1	1.0	<2.44E+0
Ruthenium	101	<7.00E-1	NC	<7.00E-1	1.0	<5.68E+0
Molybdenum	98	<1.00E+0	<1.00E+0	<1.00E-0	0.5	<4.06E+0
Niobium	93	<3.00E+0	<3.00E-1	<3.00E+0	1.0	<2.44E+1
Zirconium	90	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<4.06E+0
Yttrium	89	<2.00E-1	NC	<2.00E-1	1.0	<1.62E+0
Strontium	86	5.00E+0	<2.00E-1	5.00E+0	0.2	8.12E+0
Rubidium	85	3.00E+0	<3.00E-1	3.00E+0	0.2	4.87E+0
Bromine	79	<3.00E-1	<5.00E-1	<3.00E-1	2.5	<6.09E+0
Selenium	80	<5.00E-1	7.00E+0	<5.00E-1	0.7	<2.84E+0
Arsenic	75	<2.00E-1	<2.00E-1	<2.00E-1	0.5	<8.12E-1
Germanium	72	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<4.06E+0
Gallium	71	<5.00E-1	<4.00E-1	<5.00E-1	0.5	<2.03E+0
Zinc	66	7.00E+1	<5.00E-1	7.00E+1	1.0	5.68E+2

SSMS ANALYSIS OF SASS SAMPLES
DILUTION FILTER BLANK E050781-DFB(#374)

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	TOTAL UGRAMS	
Copper	63	2.00E+1	<1.00E+0	2.00E+1	0.5	8.12E+1	
Nickel	58	5.00E+0	<3.00E-1	5.00E+0	0.5	2.03E+1	
Cobalt	59	5.00E-1	<2.00E-1	5.00E-1	0.5	2.03E+0	
Iron	57	7.00E+1	1.00E+0	6.90E+1	0.3	1.68E+2	
Manganese	55	5.00E+0	1.50E-1	4.85E+0	0.3	1.18E+1	
Chromium	53	5.00E-1	<1.50E-1	5.00E-1	0.3	1.22E+0	
Vanadium	51	2.00E-1	<1.50E-1	2.00E-1	0.3	4.87E-1	
Titanium	47	3.00E+0	<4.00E-1	3.00E+0	0.5	1.22E+1	
Scandium	45	<1.00E+0	NC	<1.00E+0	1.0	<8.12E+0	
Calcium	43	3.00E+2	1.00E+0	2.99E+2	0.5	1.21E+3	
Potassium	41	5.00E+3	3.00E-1	5.00E+3	0.1	4.06E+3	
Chlorine	35	1.00E+2	3.00E+0	9.70E+1	1.0	7.88E+2	
Sulphur	33	2.00E+2	NC	2.00E+2	1.0	1.62E+3	
Phosphorus	31/2	3.00E+1	<1.00E-1	3.00E+1	0.4	9.74E+1	
Silicon	29/2	5.00E+3	5.00E+1	4.95E+3	0.3	1.21E+4	
Aluminum	27/2	7.00E+3	1.00E+1	6.99E+3	0.3	1.70E+4	
Magnesium	25/2	3.00E+1	<6.00E-1	3.00E+1	0.1	2.44E+1	
Sodium	23/2	2.00E+4	2.00E+0	2.00E+4	0.3	4.87E+4	
Fluorine	19	<2.00E+1	<2.00E-1	<2.00E+1	2.0	<3.25E+2	
Boron	10	1.00E+1	1.50E-1	9.85E+0	0.3	2.40E+1	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	<1.50E+1	<1.50E-2	<1.50E+1	0.3	<3.65E+1	

TOTALS: 8.82E+4
<8.74E+2

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION.

RW=1.01E-01 TV=1.00E+02 AV=1.00E+01 F=1.25E-01 NF=1.00E+00

SSMS ANALYSIS OF SASS SAMPLES
IMPINGER + CONDENSATE E050781-HI/CD/O(#382/#384) BKL CORR

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3
Uranium	238	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<3.65E-1
Thorium	232	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<3.65E-1
Bismuth	209	<1.00E-1	<6.00E-1	<1.00E-1	1.0	<1.22E-1
Lead	208	<2.00E-1	<1.00E+0	<2.00E-1	2.0	<4.87E-1
Thallium	205	<1.00E-1	<2.00E+0	<1.00E-1	2.0	<2.43E-1
Mercury	202	<5.00E-1	<2.00E+0	<5.00E-1	10.	<6.09E+0
Gold	197	<1.00E-1	NC	<1.00E-1	1.0	<1.22E-1
Platinum	195	<2.00E-1	NC	<2.00E-1	1.0	<2.43E-1
Iridium	193	<2.00E-1	NC	<2.00E-1	1.0	<2.43E-1
Osmium	190	<5.00E-1	NC	<5.00E-1	1.0	<6.09E-1
Rhenium	187	<2.00E-1	NC	<2.00E-1	1.0	<2.43E-1
Tungsten	184	<2.00E-1	<2.00E+0	<2.00E-1	1.0	<2.43E-1
Tantalum	181	<5.00E-1	<5.00E+0	<5.00E-1	2.0	<1.22E+0
Hafnium	178	<2.00E-1	NC	<2.00E-1	5.0	<1.22E+0
Lutecium	175	<1.00E-1	NC	<1.00E-1	1.0	<1.22E-1
Ytterbium	174	<2.00E-1	NC	<2.00E-1	1.0	<2.43E-1
Thulium	169	<1.00E-1	NC	<1.00E-1	1.0	<1.22E-1
Erbium	166	<2.00E-1	NC	<2.00E-1	1.0	<2.43E-1
Holmium	165	<1.00E-1	NC	<1.00E-1	1.0	<1.22E-1
Dysprosium	164	<2.00E-1	NC	<2.00E-1	1.0	<2.43E-1
Terbium	159	<7.00E-2	NC	<7.00E-2	1.0	<8.52E-2
Gadolinium	158	<2.00E-1	NC	<2.00E-1	1.0	<2.43E-1
Europium	153	<1.00E-1	NC	<1.00E-1	1.0	<1.22E-1
Samarium	152	<2.00E-1	NC	<2.00E-1	1.0	<2.43E-1
Neodymium	144	<7.00E-1	NC	<7.00E-1	1.0	<8.52E-1
Praseodymium	141	<7.00E-2	NC	<7.00E-2	1.0	<8.52E-2
Cerium	140	<7.00E-2	<3.00E-1	<7.00E-2	1.0	<8.52E-2
Lanthanum	139	<7.00E-2	NC	<7.00E-2	1.0	<8.52E-2
Barium	137	5.00E-1	<6.00E-1	5.00E-1	0.7	2.71E-1
Cesium	133	<7.00E-2	<3.00E-1	<7.00E-2	0.5	<4.26E-2
Iodine	127	<7.00E-2	1.00E+0	<7.00E-2	1.5	<1.28E-1
Tellurium	128	<2.00E-1	<1.00E+0	<2.00E-1	1.0	<2.43E-1
Antimony	121	<1.00E-1	<6.00E-1	<1.00E-1	0.6	<7.30E-2
Tin	118	5.00E-1	<1.00E+0	5.00E-1	1.0	6.09E-1
Indium	115	<7.00E-2	<3.00E-1	<7.00E-2	1.0	<8.52E-2
Cadmium	114	<2.00E-1	<1.00E+0	<2.00E-1	3.0	<7.30E-1
Silver	107	5.00E-1	<5.00E-1	5.00E-1	1.0	6.09E-1
Palladium	105	<2.00E-1	NC	<2.00E-1	1.0	<2.43E-1
Rhodium	103	<7.00E-2	NC	<7.00E-2	1.0	<8.52E-2
Ruthenium	101	<1.00E-1	NC	<1.00E-1	1.0	<1.22E-1
Molybdenum	98	5.00E+0	<1.00E+0	5.00E+0	1.0	5.78E+0
Niobium	93	<5.00E-1	<3.00E-1	<5.00E-1	1.0	<6.09E-1
Zirconium	90	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<3.65E-1
Yttrium	89	<5.00E-2	NC	<5.00E-2	1.0	<6.09E-2
Strontium	86	7.00E-2	<2.00E-1	7.00E-2	0.5	3.02E-2
Rubidium	85	<7.00E-2	<3.00E-1	<7.00E-2	0.5	<4.26E-2
Bromine	79	7.00E-2	<5.00E-1	7.00E-2	4.0	NG
Selenium	80	<2.00E-1	7.00E+0	<2.00E-1	2.0	<4.87E-1
Arsenic	75	1.00E-1	<2.00E-1	1.00E-1	1.0	9.06E-2
Germanium	72	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<6.09E-1
Gallium	71	1.00E-1	<4.00E-1	1.00E-1	0.6	7.30E-2
Zinc	66	7.00E-1	<5.00E-1	7.00E-1	2.0	1.49E-1

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SSMS ANALYSIS OF SASS SAMPLES
IMPINGER + CONDENSATE E050781-HI/CD/O(#382/#384) BKL CORR

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3	
Copper	63	7.00E-1	<1.00E+0	7.00E-1	1.0	5.41E-1	
Nickel	58	5.00E+1	<3.00E-1	5.00E+1	1.0	6.06E+1	
Cobalt	59	2.00E+0	<2.00E-1	2.00E+0	1.0	2.28E+0	
Iron	57	2.00E+2	1.00E+0	1.99E+2	1.0	2.41E+2	
Manganese	55	1.00E+1	1.50E-1	9.85E+0	1.0	1.20E+1	
Chromium	53	3.00E+1	<1.50E-1	3.00E+1	1.0	3.65E+1	
Vanadium	51	2.00E-1	<1.50E-1	2.00E-1	1.0	2.34E-1	
Titanium	47	5.00E+1	<4.00E-1	5.00E+1	2.0	1.22E+2	
Scandium	45	<2.00E-1	NC	<2.00E-1	0.7	<1.70E-1	
Calcium	43	5.00E+0	1.00E+0	4.00E+0	0.3	NG	
Potassium	41	1.00E+1	3.00E-1	9.70E+0	0.3	4.42E-1	
Chlorine	35	5.00E+1	3.00E+0	4.70E+1	0.5	2.74E+1	
Sulphur	33	5.00E+3	NC	5.00E+3	1.0	6.06E+3	
Phosphorus	31/2	5.00E+0	<1.00E-1	5.00E+0	1.0	5.71E+0	
Silicon	29/2	2.00E+1	5.00E+1	<3.00E+1	0.7	<2.56E+1	
Aluminum	27/2	2.00E+1	1.00E+1	1.00E+1	1.0	8.44E+0	
Magnesium	25/2	1.00E+0	<6.00E-1	1.00E+0	0.5	6.09E-1	
Sodium	23/2	1.50E+4	2.00E+0	1.50E+4	3.0	5.48E+4	
Fluorine	19	<4.00E+0	<2.00E-1	<4.00E+0	2.0	<9.74E+0	
Boron	10	5.00E-1	1.50E-1	3.50E-1	0.3	1.23E-1	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	<3.00E+0	<1.50E-2	<3.00E+0	0.3	<1.10E+0	

TOTALS: 6.13E+4
<5.52E+1

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION

RW=1.97E-01 TV=1.99E+03 AV=1.00E+01 F=1.00E+00 NF=1.00E+00
TW=1.00E+00 AW=1.00E+00 M3=3.22E+01

SSMS ANALYSIS OF SASS SAMPLES
FILTER E050781-PFA(#377) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAM/M**3
Uranium	238	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<1.25E-1
Thorium	232	<5.00E-1	<6.00E-1	<5.00E-1	2.0	<2.50E-1
Bismuth	209	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<1.25E-1
Lead	208	1.50E+2	<1.00E+0	1.50E+2	1.0	3.75E+1
Thallium	205	<7.00E-1	<2.00E+0	<7.00E-1	2.0	<3.50E-1
Mercury	202	<2.00E+0	<2.00E+0	<2.00E+0	10.	<5.01E+0
Gold	197	<5.00E-1	NC	<5.00E-1	1.0	<1.25E-1
Platinum	195	<1.00E+0	NC	<1.00E+0	1.0	<2.50E-1
Iridium	193	<1.00E+0	NC	<1.00E+0	1.0	<2.50E-1
Osmium	190	<2.00E+0	NC	<2.00E+0	1.0	<5.01E-1
Rhenium	187	<1.00E+0	NC	<1.00E+0	1.0	<2.50E-1
Tungsten	184	<1.00E+0	<2.00E+0	<1.00E+0	1.0	<2.50E-1
Tantalum	181	<5.00E+0	<5.00E+0	<5.00E+0	1.0	<1.25E+0
Hafnium	178	<1.00E+0	NC	<1.00E+0	1.0	<2.50E-1
Lutecium	175	<5.00E-1	NC	<5.00E-1	1.0	<1.25E-1
Ytterbium	174	<1.00E+0	NC	<1.00E+0	1.0	<2.50E-1
Thulium	169	<5.00E-1	NC	<5.00E-1	1.0	<1.25E-1
Erbium	166	<1.00E+0	NC	<1.00E+0	1.0	<2.50E-1
Holmium	165	<5.00E-1	NC	<5.00E-1	1.0	<1.25E-1
Dysprosium	164	<1.00E+0	NC	<1.00E+0	1.0	<2.50E-1
Terbium	159	<3.00E-1	NC	<3.00E-1	1.0	<7.51E-2
Gadolinium	158	<1.00E+0	NC	<1.00E+0	1.0	<2.50E-1
Europium	153	<7.00E-1	NC	<7.00E-1	1.0	<1.75E-1
Samarium	152	<1.00E+0	NC	<1.00E+0	1.0	<2.50E-1
Neodymium	144	<3.00E+0	NC	<3.00E+0	1.0	<7.51E-1
Praseodymium	141	<3.00E-1	NC	<3.00E-1	1.0	<7.51E-2
Cerium	140	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<3.75E-2
Lanthanum	139	<3.00E-1	NC	<3.00E-1	1.0	<7.51E-2
Barium	137	3.00E+1	<6.00E-1	3.00E+1	1.0	NG
Cesium	133	<3.00E-1	<3.00E-1	<3.00E-1	0.1	<1.13E-2
Iodine	127	<3.00E-1	1.00E+0	<3.00E-1	1.5	<1.13E-1
Tellurium	128	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<2.50E-1
Antimony	121	<5.00E-1	<6.00E-1	<5.00E-1	0.6	<7.51E-2
Tin	118	2.00E+0	<1.00E+0	2.00E+0	1.0	NG
Indium	115	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<3.75E-2
Cadmium	114	<1.00E+0	<1.00E+0	<1.00E+0	3.0	<7.51E-1
Silver	107	<5.00E-1	<5.00E-1	<5.00E-1	0.3	<3.75E-2
Palladium	105	<1.00E+0	NC	<1.00E+0	1.0	<2.50E-1
Rhodium	103	<3.00E+0	NC	<3.00E+0	1.0	<7.51E-1
Ruthenium	101	<7.00E-1	NC	<7.00E-1	1.0	<1.75E-1
Molybdenum	98	1.00E+0	<1.00E+0	1.00E+0	0.5	1.25E-1
Niobium	93	<2.00E+0	<3.00E-1	<2.00E+0	1.0	<5.01E-1
Zirconium	90	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<1.25E-1
Yttrium	89	<2.00E-1	NC	<2.00E-1	1.0	<5.01E-2
Strontium	86	2.00E-1	<2.00E-1	2.00E-1	0.2	NG
Rubidium	85	<3.00E-1	<3.00E-1	<3.00E-1	0.2	<1.50E-2
Bromine	79	5.00E-1	<5.00E-1	5.00E-1	2.5	1.86E-3
Selenium	80	<5.00E-1	7.00E+0	<5.00E-1	0.7	<8.76E-2
Arsenic	75	5.00E-1	<2.00E-1	5.00E-1	0.5	6.26E-2
Germanium	72	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<1.25E-1
Gallium	71	<5.00E-1	<4.00E-1	<5.00E-1	0.5	<6.26E-2
Zinc	66	5.00E+2	<5.00E-1	5.00E+2	1.0	1.23E+2

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SSMS ANALYSIS OF SASS SAMPLES
FILTER E050781-PFA(#377) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAM/M**3	
Copper	63	2.00E+1	<1.00E+0	2.00E+1	0.5	2.13E+0	
Nickel	58	7.00E+0	<3.00E-1	7.00E+0	0.5	5.22E-3	
Cobalt	59	<5.00E-1	<2.00E-1	<5.00E-1	0.5	<6.26E-2	
Iron	57	1.00E+2	1.00E+0	9.90E+1	0.3	2.28E+0	
Manganese	55	1.00E+0	1.50E-1	8.50E-1	0.3	3.80E-4	
Chromium	53	2.00E+0	<1.50E-1	2.00E+0	0.3	NG	
Vanadium	51	1.00E-1	<1.50E-1	1.00E-1	0.3	4.47E-5	
Titanium	47	3.00E+0	<4.00E-1	3.00E+0	0.5	NG	
Scandium	45	<1.00E+0	NC	<1.00E+0	1.0	<2.50E-1	
Calcium	43	7.00E+1	1.00E+0	6.90E+1	0.5	NG	
Potassium	41	5.00E+2	3.00E-1	5.00E+2	0.1	6.29E+0	
Chlorine	35	1.00E+1	3.00E+0	7.00E+0	1.0	NG	
Sulphur	33	7.00E+2	NC	7.00E+2	1.0	1.04E+0	
Phosphorus	31/2	5.00E+2	<1.00E-1	5.00E+2	0.4	4.98E+1	
Silicon	29/2	1.00E+3	5.00E+1	9.50E+2	0.3	4.25E-1	
Aluminum	27/2	2.00E+2	1.00E+1	1.90E+2	0.3	8.50E-2	
Magnesium	25/2	2.00E+2	<6.00E-1	2.00E+2	0.1	3.26E+0	
Sodium	23/2	3.00E+3	2.00E+0	3.00E+3	0.3	1.51E+2	
Fluorine	19	<1.00E+0	<2.00E-1	<1.00E+0	2.0	<5.01E-1	
Boron	10	2.00E+0	1.50E-1	1.85E+0	0.3	NG	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	6.00E+0	<1.50E-2	6.00E+0	0.3	2.27E-1	

TOTALS: 3.76E+2
<1.60E+1

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION.

RW=1.01E-01 TV=1.00E+02 AV=1.00E+01 F=1.25E-01 NF=1.00E+00
TW=1.00E+00 AW=1.00E+00 M3=3.22E+01

SSMS ANALYSIS OF SASS SAMPLES
RESIN E050781-XR(#369) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAM/M**3
Uranium	238	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<2.09E+0
Thorium	232	<5.00E-1	<6.00E-1	<5.00E-1	2.0	<4.18E+0
Bismuth	209	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<2.09E+0
Lead	208	<1.00E+0	<1.00E+0	<1.00E-0	1.0	<4.18E+0
Thallium	205	<7.00E-1	<2.00E+0	<7.00E-1	2.0	<5.85E+0
Mercury	202	<2.00E+0	<2.00E+0	<2.00E+0	10.	<8.35E+1
Gold	197	<5.00E-1	NC	<5.00E-1	1.0	<2.09E+0
Platinum	195	<1.00E+0	NC	<1.00E+0	1.0	<4.18E+0
Iridium	193	<1.00E+0	NC	<1.00E+0	1.0	<4.18E+0
Osmium	190	<2.00E+0	NC	<2.00E+0	1.0	<8.35E+0
Rhenium	187	<1.00E+0	NC	<1.00E-0	1.0	<4.18E+0
Tungsten	184	<1.00E+0	<2.00E+0	<1.00E+0	1.0	<4.18E+0
Tantalum	181	<3.00E+0	<5.00E+0	<3.00E+0	1.0	<1.25E+1
Hafnium	178	<1.00E+0	NC	<1.00E+0	1.0	<4.18E+0
Lutecium	175	<5.00E-1	NC	<5.00E-1	1.0	<2.09E+0
Ytterbium	174	<1.00E+0	NC	<1.00E+0	1.0	<4.18E+0
Thulium	169	<5.00E-1	NC	<5.00E-1	1.0	<2.09E+0
Erbium	166	<1.00E+0	NC	<1.00E+0	1.0	<4.18E+0
Holmium	165	<5.00E-1	NC	<5.00E-1	1.0	<2.09E+0
Dysprosium	164	<1.00E+0	NC	<1.00E+0	1.0	<4.18E+0
Terbium	159	<3.00E-1	NC	<3.00E-1	1.0	<1.25E+0
Gadolinium	158	<1.00E+0	NC	<1.00E+0	1.0	<4.18E+0
Europium	153	<7.00E-1	NC	<7.00E-1	1.0	<2.92E+0
Samarium	152	<1.00E+0	NC	<1.00E+0	1.0	<4.18E+0
Neodymium	144	<3.00E+0	NC	<3.00E+0	1.0	<1.25E+1
Praseodymium	141	<3.00E-1	NC	<3.00E-1	1.0	<1.25E+0
Cerium	140	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<6.26E-1
Lanthanum	139	<3.00E-1	NC	<3.00E-1	1.0	<1.25E+0
Barium	137	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<2.09E+0
Cesium	133	<3.00E-1	<3.00E-1	<3.00E-1	0.1	<1.88E-1
Iodine	127	<3.00E-1	1.00E+0	<3.00E-1	1.5	<1.88E+0
Tellurium	128	<1.00E+0	<1.00E+0	<1.00E-0	1.0	<4.18E+0
Antimony	121	<5.00E-1	<6.00E-1	<5.00E-1	0.6	<1.25E+0
Tin	118	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<4.18E+0
Indium	115	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<6.26E-1
Cadmium	114	<1.00E+0	<1.00E+0	<1.00E+0	3.0	<1.25E+1
Silver	107	<5.00E-1	<5.00E-1	<5.00E-1	0.3	<6.26E-1
Palladium	105	<1.00E+0	NC	<1.00E+0	1.0	<4.18E+0
Rhodium	103	<3.00E-1	NC	<3.00E-1	1.0	<1.25E+0
Ruthenium	101	<7.00E-1	NC	<7.00E-1	1.0	<2.92E+0
Molybdenum	98	2.00E+0	<1.00E-0	2.00E+0	0.5	NG
Niobium	93	<1.00E+0	<3.00E-1	<1.00E+0	1.0	<4.18E+0
Zirconium	90	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<2.09E+0
Yttrium	89	<2.00E-1	NC	<2.00E-1	1.0	<8.35E-1
Strontium	86	2.00E-1	<2.00E-1	2.00E-1	0.2	1.67E-1
Rubidium	85	<3.00E-1	<3.00E-1	<3.00E-1	0.2	<2.51E-1
Bromine	79	<5.00E-1	<5.00E-1	<5.00E-1	2.5	<5.22E+0
Selenium	80	<5.00E-1	7.00E+0	<5.00E-1	0.7	<1.46E+0
Arsenic	75	<2.00E-1	<2.00E-1	<2.00E-1	0.5	<4.18E-1
Germanium	72	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<2.09E+0
Gallium	71	<5.00E-1	<4.00E-1	<5.00E-1	0.5	<1.04E+0
Zinc	66	2.00E+1	<5.00E-1	2.00E+1	1.0	4.18E+1

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SSMS ANALYSIS OF SASS SAMPLES
RESIN E050781-XR(#369)  BLANK CORRECTED

             LINE USED  UNCORRECTED                CORRECTED
                FOR       SAMPLE        BLANK       SAMPLE
  ELEMENT    ESTIMATE     VALUE         VALUE       VALUE    RSC   UGRAM/M**3

Copper          63        1.00E+1     <1.00E+0     1.00E+1   0.5    1.05E+1
Nickel          58        2.00E+2     <3.00E-1     2.00E+2   0.5    2.72E+2
Cobalt          59        2.00E+0     <2.00E-1     2.00E+0   0.5    2.09E+0
Iron            57        2.00E+2      1.00E+0     1.99E+2   0.3    1.63E+2
Manganese       55        5.00E+0      1.50E-1     4.85E+0   0.3    5.39E+0
Chromium        53        5.00E+1     <1.50E-1     5.00E+1   0.3    5.01E+1
Vanadium        51        2.00E-1     <1.50E-1     2.00E-1   0.3    1.26E-1
Titanium        47        1.00E+1     <4.00E-1     1.00E+1   0.5    1.05E+1
Scandium        45       <1.00E+0      NC         <1.00E+0   1.0   <4.18E+0
Calcium         43        2.00E+2      1.00E+0     1.99E+2   0.5    2.09E+2
Potassium       41        1.00E+2      3.00E-1     9.97E+1   0.1    2.09E+1
Chlorine        35        7.00E+0      3.00E+0     4.00E+0   1.0    NG
Sulphur         33        2.00E+2      NC          2.00E+2   1.0    2.10E+2
Phosphorus      31/2      3.00E+0     <1.00E-1     3.00E+0   0.4    NG
Silicon         29/2      5.00E+3      5.00E+1     4.95E+3   0.3    NG
Aluminum        27/2      7.00E+1      1.00E+1     6.00E+1   0.3    NG
Magnesium       25/2      7.00E+1     <6.00E-1     7.00E+1   0.1    NG
Sodium          23/2      2.00E+2      2.00E+0     1.98E+2   0.3    NG
Fluorine        19       <1.00E+0     <2.00E-1    <1.00E+0   2.0   <8.35E+0
Boron           10        5.00E+0      1.50E-1     4.85E+0   0.3    2.51E+0
Beryllium        9        NC          <3.00E-2     NG        0.5    NG        A
Lithium          7        3.00E+0     <1.50E-2     3.00E+0   0.3    NG

                                                          TOTALS:  9.98E+2
                                                                  <2.59E+2

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION

RW=1.00E-01   TV=1.00E+02   AV=1.00E+01   F=1.00E+00   NF=1.00E+00
TW=1.34E+02   AW=1.00E+00   M3=3.22E+01
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SSMS ANALYSIS OF SASS SAMPLES
CYCLONE CATCH E050781-3C/10C(#378/#379)

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3
Uranium	238	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<1.47E-3
Thorium	232	<5.00E-1	<6.00E-1	<5.00E-1	2.0	<2.95E-3
Bismuth	209	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<1.47E-3
Lead	208	<3.00E+0	<1.00E+0	<3.00E+0	1.0	<8.84E-3
Thallium	205	<7.00E-1	<2.00E+0	<7.00E-1	2.0	<4.12E-3
Mercury	202	<3.00E+0	<2.00E+0	<3.00E+0	10	<8.84E-2
Gold	197	<5.00E-1	NC	<5.00E-1	1.0	<1.47E-3
Platinum	195	<1.00E+0	NC	<1.00E+0	1.0	<2.95E-3
Iridium	193	<1.00E+0	NC	<1.00E+0	1.0	<2.95E-3
Osmium	190	<2.00E+0	NC	<2.00E+0	1.0	<5.89E-3
Rhenium	187	<1.00E+0	NC	<1.00E+0	1.0	<2.95E-3
Tungsten	184	<1.00E+0	<2.00E+0	<1.00E+0	1.0	<2.95E-3
Tantalum	181	<7.00E-1	<5.00E+0	<7.00E-1	1.0	<2.06E-3
Hafnium	178	<1.00E+0	NC	<1.00E+0	1.0	<2.95E-3
Lutecium	175	<5.00E-1	NC	<5.00E-1	1.0	<1.47E-3
Ytterbium	174	<1.00E+0	NC	<1.00E+0	1.0	<2.95E-3
Thulium	169	<5.00E-1	NC	<5.00E-1	1.0	<1.47E-3
Erbium	166	<1.00E+0	NC	<1.00E+0	1.0	<2.95E-3
Holmium	165	<5.00E-1	NC	<5.00E-1	1.0	<1.47E-3
Dysprosium	164	<1.00E+0	NC	<1.00E+0	1.0	<2.95E-3
Terbium	159	<3.00E-1	NC	<3.00E-1	1.0	<8.84E-4
Gadolinium	158	<1.00E+0	NC	<1.00E+0	1.0	<2.95E-3
Europium	153	<7.00E-1	NC	<7.00E-1	1.0	<2.06E-3
Samarium	152	<1.00E+0	NC	<1.00E+0	1.0	<2.95E-3
Neodymium	144	<3.00E+0	NC	<3.00E+0	1.0	<8.84E-3
Praseodymium	141	3.00E-1	NC	3.00E-1	1.0	8.84E-4
Cerium	140	5.00E-1	<3.00E-1	5.00E-1	0.5	7.36E-4
Lanthanum	139	<3.00E-1	NC	<3.00E-1	1.0	<8.84E-4
Barium	137	3.00E+3	<6.00E-1	3.00E+3	1.0	8.84E+0
Cesium	133	<3.00E-1	<3.00E-1	<3.00E-1	0.1	<1.33E-4
Iodine	127	<3.00E-1	1.00E+0	<3.00E-1	1.5	<1.33E-3
Tellurium	128	<2.00E+0	<1.00E+0	<2.00E+0	1.0	<5.89E-3
Antimony	121	7.00E-1	<6.00E-1	7.00E-1	0.6	1.24E-3
Tin	118	1.00E+0	<1.00E+0	1.00E+0	1.0	2.95E-3
Indium	115	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<4.42E-4
Cadmium	114	<1.00E+0	<1.00E+0	<1.00E+0	3.0	<8.84E-3
Silver	107	2.00E+0	<5.00E-1	2.00E+0	0.3	1.77E-3
Palladium	105	<1.00E+0	NC	<1.00E+0	1.0	2.95E-3
Rhodium	103	<3.00E-1	NC	<3.00E-1	1.0	<8.84E-4
Ruthenium	101	<1.00E+0	NC	<1.00E+0	1.0	<2.95E-3
Molybdenum	98	<1.00E+0	<1.00E+0	<1.00E+0	0.5	<1.47E-3
Niobium	93	<2.00E+0	<3.00E-1	<2.00E+0	1.0	<5.89E-3
Zirconium	90	3.00E+1	<6.00E-1	3.00E+1	1.0	8.84E-2
Yttrium	89	<2.00E-1	NC	<2.00E-1	1.0	<5.89E-4
Strontium	86	7.00E+1	<2.00E-1	7.00E+1	0.2	4.12E-2
Rubidium	85	5.00E+1	<3.00E-1	5.00E+1	0.2	2.95E-2
Bromine	79	7.00E+0	<5.00E-1	7.00E+0	2.5	5.15E-2
Selenium	80	<7.00E-1	7.00E+0	<7.00E-1	0.7	<1.44E-3
Arsenic	75	2.00E-1	<2.00E-1	2.00E-1	0.5	2.95E-4
Germanium	72	<1.00E+0	<6.00E-1	<1.00E+0	1.0	<2.95E-3
Gallium	71	2.00E+0	<4.00E-1	2.00E+0	0.5	2.95E-3
Zinc	66	5.00E+3	<5.00E-1	5.00E+3	1.0	1.47E+1

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SSMS ANALYSIS OF SASS SAMPLES
CYCLONE CATCH E050781-3C/10C(#378/#379)

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3	
Copper	63	2.00E+1	<1.00E+0	2.00E+1	0.5	2.95E-2	
Nickel	58	1.00E+1	<3.00E-1	1.00E+1	0.5	1.47E-2	
Cobalt	59	1.00E+0	<2.00E-1	1.00E+0	0.5	1.47E-3	
Iron	57	1.00E+4	1.00E+0	1.00E+4	0.3	8.83E+0	
Manganese	55	1.50E+2	1.50E-1	1.50E+2	0.3	1.32E-1	
Chromium	53	1.50E+2	<1.50E-1	1.50E+2	0.3	1.33E-1	
Vanadium	51	2.00E+0	<1.50E-1	2.00E+0	0.3	1.77E-3	
Titanium	47	3.50E+2	<4.00E-1	3.50E+2	0.5	5.15E-1	
Scandium	45	<1.00E+0	NC	<1.00E+0	1.0	<2.95E-3	
Calcium	43	7.50E+4	1.00E+0	7.50E+4	0.5	1.10E+2	
Potassium	41	5.00E+4	3.00E-1	5.00E+4	0.1	1.47E+1	
Chlorine	35	2.00E+2	3.00E+0	1.97E+2	1.0	5.80E-1	
Sulphur	33	3.50E+2	NC	3.50E+2	1.0	1.03E+0	
Phosphorus	31/2	1.50E+2	<1.00E-1	1.50E+2	0.4	1.77E-1	
Silicon	29/2	1.00E+5	5.00E+1	1.00E+5	0.3	8.83E+1	
Aluminum	27/2	4.50E+4	1.00E+1	4.50E+4	0.3	3.97E+1	
Magnesium	25/2	4.00E+4	<6.00E-1	4.00E+4	0.1	1.18E+1	
Sodium	23/2	6.00E+4	2.00E+0	6.00E+4	0.3	5.30E+1	
Fluorine	19	1.00E+2	<2.00E-1	1.00E+2	2.0	5.89E-1	
Boron	10	5.00E+3	1.50E-1	5.00E+3	0.3	4.42E+0	
Beryllium	9	NC	<3.00E-2	NC	0.5	NC	A
Lithium	7	2.00E+1	<1.50E-2	2.00E+1	0.3	1.77E-2	
					TOTALS:	3.58E+2 <2.02E-1	

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION.

RW=2.00E-03   TV=1.00E+00   AV=1.00E+00   F=1.00E+00   NF=1.00E+00
TW=4.74E-02   AW=1.00E-03   M3=3.22E+01

SSMS ANALYSIS OF SASS SAMPLES
DILUTION FILTER   E050781-DF13/DF14(#380/#381)BLK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAM/M**3
Uranium	238	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.82E-2
Thorium	232	<5.00E-1	<6.00E-1	<5.00E-1	2.0	<1.16E-1
Bismuth	209	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.82E-2
Lead	208	3.50E+2	<1.00E+0	3.50E+2	1.0	4.07E+1
Thallium	205	<7.00E-1	<2.00E+0	<7.00E-1	2.0	<1.63E-1
Mercury	202	<2.00E+0	<2.00E+0	<2.00E+0	10.	<2.33E+0
Gold	197	<5.00E-1	NC	<5.00E-1	1.0	<5.82E-2
Platinum	195	<1.00E+0	NC	<1.00E+0	1.0	<1.16E-1
Iridium	193	<1.00E+0	NC	<1.00E+0	1.0	<1.16E-1
Osmium	190	<2.00E+0	NC	<2.00E+0	1.0	<2.33E-1
Rhenium	187	<1.00E+0	NC	<1.00E+0	1.0	<1.16E-1
Tungsten	184	<1.00E+0	<2.00E+0	<1.00E+0	1.0	<1.16E-1
Tantalum	181	<5.00E+0	<5.00E+0	<5.00E+0	1.0	<5.82E-1
Hafnium	178	<1.00E+0	NC	<1.00E+0	1.0	<1.16E-1
Lutecium	175	<5.00E-1	NC	<5.00E-1	1.0	<5.82E-2
Ytterbium	174	<1.00E+0	NC	<1.00E+0	1.0	<1.16E-1
Thulium	169	<5.00E-1	NC	<5.00E-1	1.0	<5.82E-2
Erbium	166	<1.00E+0	NC	<1.00E+0	1.0	<1.16E-1
Holmium	165	<5.00E-1	NC	<5.00E-1	1.0	<5.82E-2
Dysprosium	164	<1.00E+0	NC	<1.00E+0	1.0	<1.16E-1
Terbium	159	<3.00E-1	NC	<3.00E-1	1.0	<3.49E-2
Gadolinium	158	<1.00E+0	NC	<1.00E+0	1.0	<1.16E-1
Europium	153	<7.00E-1	NC	<7.00E-1	1.0	<8.15E-2
Samarium	152	<1.00E+0	NC	<1.00E+0	1.0	<1.16E-1
Neodymium	144	<3.00E+0	NC	<3.00E+0	1.0	<3.49E-1
Praseodymium	141	<3.00E-1	NC	<3.00E-1	1.0	<3.49E-2
Cerium	140	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<1.75E-2
Lanthanum	139	<3.00E-1	NC	<3.00E-1	1.0	<3.49E-2
Barium	137	5.00E+2	<6.00E-1	5.00E+2	1.0	1.90E+1
Cesium	133	<3.00E-1	<3.00E-1	<3.00E-1	0.1	<5.24E-3
Iodine	127	<3.00E-1	1.00E+0	<3.00E-1	1.5	<5.24E-2
Tellurium	128	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<1.16E-1
Antimony	121	<5.00E-1	<6.00E-1	<5.00E-1	0.6	<3.49E-2
Tin	118	3.00E+0	<1.00E+0	3.00E+0	1.0	NG
Indium	115	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<1.75E-2
Cadmium	114	<1.00E+0	<1.00E+0	<1.00E+0	3.0	<3.49E-1
Silver	107	<5.00E-1	<5.00E-1	<5.00E-1	0.3	<1.75E-2
Palladium	105	<1.00E+0	NC	<1.00E+0	1.0	<1.16E-1
Rhodium	103	<3.00E+0	NC	<3.00E+0	1.0	<3.49E-1
Ruthenium	101	<7.00E-1	NC	<7.00E-1	1.0	<8.15E-2
Molybdenum	98	5.00E+0	<1.00E+0	5.00E+0	0.5	2.91E-1
Niobium	93	<2.00E+0	<3.00E-1	<2.00E+0	1.0	<2.33E-1
Zirconium	90	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.82E-2
Yttrium	89	<2.00E-1	NC	<2.00E-1	1.0	<2.33E-2
Strontium	86	2.00E+1	<2.00E-1	2.00E+1	0.2	2.70E-1
Rubidium	85	3.00E+0	<3.00E-1	3.00E+0	0.2	NG
Bromine	79	<3.00E-1	<5.00E-1	<3.00E-1	2.5	<8.73E-2
Selenium	80	<1.00E+0	7.00E+0	<1.00E+0	0.7	<8.15E-2
Arsenic	75	2.00E+0	<2.00E-1	2.00E+0	0.5	1.16E-1
Germanium	72	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<5.82E-2
Gallium	71	<1.00E+0	<4.00E-1	<1.00E+0	0.5	<5.82E-2
Zinc	66	1.00E+2	<5.00E-1	1.00E+2	1.0	NG

SSMS ANALYSIS OF SASS SAMPLES
DILUTION FILTER   E050781-DF13/DF14(#380/#381)BLK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAM/M**3	
Copper	63	3.00E+1	<1.00E+0	3.00E+1	0.5	NG	
Nickel	58	2.00E+1	<3.00E-1	2.00E+1	0.5	6.74E-1	
Cobalt	59	2.00E+1	<2.00E-1	2.00E+1	0.5	1.11E+0	
Iron	57	2.00E+2	1.00E+0	1.99E+2	0.3	2.90E+0	
Manganese	55	1.00E+1	1.50E-1	9.85E+0	0.3	5.91E-2	
Chromium	53	5.00E+0	<1.50E-1	5.00E+0	0.3	1.45E-1	
Vanadium	51	1.00E+0	<1.50E-1	1.00E+0	0.3	2.32E-2	
Titanium	47	3.00E+1	<4.00E-1	3.00E+1	0.5	1.45E+0	
Scandium	45	<1.00E+0	NC	<1.00E+0	1.0	<1.16E-1	
Calcium	43	1.00E+3	1.00E+0	9.99E+2	0.5	2.89E+1	
Potassium	41	2.50E+3	3.00E-1	2.50E+3	0.1	NG	
Chlorine	35	3.00E+1	3.00E+0	2.70E+1	1.0	NG	
Sulphur	33	2.00E+3	NC	2.00E+3	1.0	1.94E+2	
Phosphorus	31/2	7.00E+2	<1.00E-1	7.00E-2	0.4	3.02E+1	
Silicon	29/2	5.00E+3	5.00E+1	4.95E+3	0.3	NG	
Aluminum	27/2	5.00E+2	1.00E+1	4.90E+2	0.3	NG	
Magnesium	25/2	1.00E+2	<6.00E-1	1.00E+2	0.1	5.77E-1	
Sodium	23/2	6.00E+3	2.00E+0	6.00E+3	0.3	NG	
Fluorine	19	<5.00E+0	<2.00E-1	<5.00E+0	2.0	<1.16E+0	
Boron	10	3.00E+0	1.50E-1	2.85E+0	0.3	NG	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	<1.50E+1	<1.50E-2	<1.50E+1	0.3	<5.24E-1	

TOTALS: 3.20E+2
<9.03E+0

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION.

RW=1.21E-01   TV=1.00E+02   AV=1.00E+01   F=1.25E-01   NF=2.00E+00
TW=1.00E+00   AW=1.00E+00   M3=8.30E+01

SSMS ANALYSIS OF SASS SAMPLES
Pot residue E050781-BA(#387)

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/GRAM
Uranium	238	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<4.90E-1
Thorium	232	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<4.90E-1
Bismuth	209	5.00E-1	<6.00E-1	5.00E-1	1.0	8.17E-1
Lead	208	7.00E+2	<1.00E+0	7.00E+2	2.0	2.29E+3
Thallium	205	<1.00E-1	<2.00E+0	<1.00E-1	2.0	<3.27E-1
Mercury	202	<5.00E-1	<2.00E+0	<5.00E-1	10.	<8.17E+0
Gold	197	<1.00E-1	NC	<1.00E-1	1.0	<1.63E-1
Platinum	195	<2.00E-1	NC	<2.00E-1	1.0	<3.27E-1
Iridium	193	<2.00E-1	NC	<2.00E-1	1.0	<3.27E-1
Osmium	190	<5.00E-1	NC	<5.00E-1	1.0	<8.17E-1
Rhenium	187	<2.00E-1	NC	<2.00E-1	1.0	<3.27E-1
Tungsten	184	<2.00E-1	<2.00E+0	<2.00E-1	1.0	<3.27E-1
Tantalum	181	<1.00E-1	<5.00E+0	<1.00E-1	2.0	<3.27E-1
Hafnium	178	<2.00E-1	NC	<2.00E-1	5.0	<1.63E+0
Lutecium	175	<1.00E-1	NC	<1.00E-1	1.0	<1.63E-1
Ytterbium	174	<2.00E-1	NC	<2.00E-1	1.0	<3.27E-1
Thulium	169	<1.00E-1	NC	<1.00E-1	1.0	<1.63E-1
Erbium	166	<2.00E-1	NC	<2.00E-1	1.0	<3.27E-1
Holmium	165	<1.00E-1	NC	<1.00E-1	1.0	<1.63E-1
Dysprosium	164	<2.00E-1	NC	<2.00E-1	1.0	<3.27E-1
Terbium	159	<7.00E-2	NC	<7.00E-2	1.0	<1.14E-1
Gadolinium	158	<3.00E-1	NC	<3.00E-1	1.0	<4.90E-1
Europium	153	<2.00E-1	NC	<2.00E-1	1.0	<3.27E-1
Samarium	152	<3.00E-1	NC	<3.00E-1	1.0	<4.90E-1
Neodymium	144	<5.00E-1	NC	<5.00E-1	1.0	<8.17E-1
Praseodymium	141	7.00E-2	NC	7.00E-2	1.0	1.14E-1
Cerium	140	2.00E-1	<3.00E-1	2.00E-1	1.0	3.27E-1
Lanthanum	139	2.00E-1	NC	2.00E-1	1.0	3.27E-1
Barium	137	1.00E+2	<6.00E-1	1.00E+2	0.7	1.14E+2
Cesium	133	<7.00E-2	<3.00E-1	<7.00E-2	0.5	<5.72E-2
Iodine	127	1.00E-1	1.00E+0	<9.00E-1	1.5	<2.20E+0
Tellurium	128	<2.00E-1	<1.00E+0	<2.00E-1	1.0	<3.27E-1
Antimony	121	1.00E+0	<6.00E-1	1.00E+0	0.6	9.80E-1
Tin	118	1.00E+2	<1.00E+0	1.00E+2	1.0	1.63E+2
Indium	115	<1.00E+0	<3.00E-1	<1.00E+0	1.0	<1.63E+0
Cadmium	114	5.00E+0	<1.00E+0	5.00E+0	3.0	2.45E+1
Silver	107	<2.00E-1	<5.00E-1	<2.00E-1	1.0	<3.27E-1
Palladium	105	<3.00E-1	NC	<3.00E-1	1.0	<4.90E-1
Rhodium	103	<3.00E+0	NC	<3.00E+0	1.0	<4.90E+0
Ruthenium	101	<3.00E+0	NC	<3.00E+0	1.0	<4.90E+0
Molybdenum	98	3.00E+1	<1.00E+0	3.00E+1	1.0	4.90E+1
Niobium	93	<3.00E-1	<3.00E-1	<3.00E-1	1.0	<4.90E-1
Zirconium	90	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<4.90E-1
Yttrium	89	<5.00E-2	NC	<5.00E-2	1.0	<8.17E-2
Strontium	86	7.00E+1	<2.00E-1	7.00E+1	0.5	5.72E+1
Rubidium	85	<5.00E-2	<3.00E-1	<5.00E-2	0.5	<4.08E-2
Bromine	79	<1.00E-1	<5.00E-1	<1.00E-1	4.0	<6.53E-1
Selenium	80	<1.00E-1	7.00E+0	<1.00E-1	2.0	<3.27E-1
Arsenic	75	<7.00E+0	<2.00E-1	<7.00E+0	1.0	<1.14E+1
Germanium	72	<1.00E-1	<6.00E-1	<1.00E-1	1.0	<1.63E-1
Gallium	71	<1.00E-1	<4.00E-1	<1.00E-1	0.6	<9.80E-2
Zinc	66	5.00E+4	<5.00E-1	5.00E+4	2.0	1.63E+5

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SSMS ANALYSIS OF SASS SAMPLES
Pot residue E050781-BA(#387)

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/GRAM	
Copper	63	1.50E+3	<1.00E+0	1.50E+3	1.0	2.45E+3	
Nickel	58	5.00E+1	<3.00E-1	5.00E+1	1.0	8.17E+1	
Cobalt	59	3.00E+1	<2.00E-1	3.00E+1	1.0	4.90E+1	
Iron	57	1.50E+4	1.00E+0	1.50E+4	1.0	2.45E+4	
Manganese	55	5.00E+2	1.50E-1	5.00E+2	1.0	8.16E+2	
Chromium	53	3.00E+2	<1.50E-1	3.00E+2	1.0	4.90E+2	
Vanadium	51	1.00E+0	<1.50E-1	1.00E+0	1.0	1.63E+0	
Titanium	47	7.00E+1	<4.00E-1	7.00E+1	2.0	2.29E+2	
Scandium	45	<2.00E-1	NC	<2.00E-1	0.7	<2.29E-1	
Calcium	43	1.12E+5	1.00E+0	1.12E+5	0.3	5.49E+4	
Potassium	41	2.00E+3	3.00E-1	2.00E+3	0.3	9.80E+2	
Chlorine	35	7.50E+3	3.00E+0	7.50E+3	0.5	6.12E+3	
Sulphur	33	3.00E+3	NC	3.00E+3	1.0	4.90E+3	
Phosphorus	31/2	5.00E+4	<1.00E-1	5.00E+4	1.0	8.17E+4	
Silicon	29/2	5.00E+2	5.00E+1	4.50E+2	0.7	5.14E+2	
Aluminum	27/2	5.00E+2	1.00E+1	4.90E-2	1.0	8.00E+2	
Magnesium	25/2	5.00E+4	<6.00E-1	5.00E+4	0.5	4.08E+4	
Sodium	23/2	3.50E+3	2.00E+0	3.50E+3	3.0	1.71E+4	
Fluorine	19	<3.00E-1	<2.00E-1	<3.00E-1	2.0	<9.80E-1	
Boron	10	1.00E+3	1.50E-1	1.00E+3	0.3	4.90E+2	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	3.00E+1	<1.50E-2	3.00E+1	0.3	1.47E+1	
					TOTALS:	4.03E+5 <4.72E+1	

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION

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RW=1.63E-01   TV=1.00E+02   AV=1.00E+01   F=1.00E+00   NF=1.00E+00
TW=1.00E+00   AW=1.00E+00   M3=1.00E+00
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SSMS ANALYSIS OF SASS SAMPLES
IMPINGER + CONDENSATE S052081-HI/CD/O(#403/401) BLK CORR

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3
Uranium	238	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<3.07E-1
Thorium	232	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<3.07E-1
Bismuth	209	2.00E-1	<6.00E-1	2.00E-1	1.0	2.05E-1
Lead	208	2.00E+0	<1.00E+0	2.00E+0	2.0	4.10E+0
Thallium	205	<1.00E-1	<2.00E+0	<1.00E-1	2.0	<2.05E-1
Mercury	202	<5.00E-1	<2.00E+0	<5.00E-1	10.	<5.12E+0
Gold	197	<1.00E-1	NC	<1.00E-1	1.0	<1.02E-1
Platinum	195	<2.00E-1	NC	<2.00E-1	1.0	<2.05E-1
Iridium	193	<2.00E-1	NC	<2.00E-1	1.0	<2.05E-1
Osmium	190	<5.00E-1	NC	<5.00E-1	1.0	<5.12E-1
Rhenium	187	<2.00E-1	NC	<2.00E-1	1.0	<2.05E-1
Tungsten	184	5.00E-1	<2.00E+0	5.00E-1	1.0	5.12E-1
Tantalum	181	<3.00E+0	<5.00E+0	<3.00E+0	2.0	<6.14E+0
Hafnium	178	<2.00E-1	NC	<2.00E-1	5.0	<1.02E+0
Lutecium	175	<1.00E-1	NC	<1.00E-1	1.0	<1.02E-1
Ytterbium	174	<2.00E-1	NC	<2.00E-1	1.0	<2.05E-1
Thulium	169	<1.00E-1	NC	<1.00E-1	1.0	<1.02E-1
Erbium	166	<2.00E-1	NC	<2.00E-1	1.0	<2.05E-1
Holmium	165	<1.00E-1	NC	<1.00E-1	1.0	<1.02E-1
Dysprosium	164	<5.00E-1	NC	<5.00E-1	1.0	<5.12E-1
Terbium	159	<7.00E-2	NC	<7.00E-2	1.0	<7.17E-2
Gadolinium	158	<2.00E-1	NC	<2.00E-1	1.0	<2.05E-1
Europium	153	<1.00E-1	NC	<1.00E-1	1.0	<1.02E-1
Samarium	152	<2.00E-1	NC	<2.00E-1	1.0	<2.05E-1
Neodymium	144	<7.00E-1	NC	<7.00E-1	1.0	<7.17E-1
Praseodymium	141	<7.00E-2	NC	<7.00E-2	1.0	<7.17E-2
Cerium	140	<7.00E-2	<3.00E-1	<7.00E-2	1.0	<7.17E-2
Lanthanum	139	7.00E-2	NC	7.00E-2	1.0	7.17E-2
Barium	137	5.00E-1	<6.00E-1	5.00E-1	1.0	5.46E-1
Cesium	133	<7.00E-2	<3.00E-1	<7.00E-2	0.5	<3.58E-2
Iodine	127	<7.00E-2	1.00E+0	<7.00E-2	1.5	<1.08E-1
Tellurium	128	<2.00E-1	<1.00E+0	<2.00E-1	1.0	<2.05E-1
Antimony	121	<1.00E-1	<6.00E-1	<1.00E-1	0.5	<5.14E-2
Tin	118	2.00E+1	<1.00E+0	2.00E+1	1.0	2.05E+1
Indium	115	<3.00E-1	<3.00E-1	<3.00E-1	1.0	<3.07E-1
Cadmium	114	<2.00E-1	<1.00E+0	<2.00E-1	3.0	<6.14E-1
Silver	107	2.00E+0	<5.00E-1	2.00E+0	1.0	2.05E+0
Palladium	105	<2.00E-1	NC	<2.00E-1	1.0	<2.05E-1
Rhodium	103	<7.00E-2	NC	<7.00E-2	1.0	<7.17E-2
Ruthenium	101	<1.00E-1	NC	<1.00E-1	1.0	<1.02E-1
Molybdenum	98	7.00E+1	<1.00E+0	7.00E+1	1.0	7.13E+1
Niobium	93	<1.00E+0	<3.00E-1	<1.00E+0	1.0	<1.02E+0
Zirconium	90	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<3.07E-1
Yttrium	89	<5.00E-2	NC	<5.00E-2	1.0	<5.12E-2
Strontium	86	7.00E-1	<2.00E-1	7.00E-1	0.5	3.45E-1
Rubidium	85	2.00E-1	<3.00E-1	2.00E-1	0.5	1.02E-1
Bromine	79	5.00E+0	<5.00E-1	5.00E+0	4.0	1.96E+1
Selenium	80	<1.00E+0	7.00E+0	<1.00E+0	2.0	<2.05E+0
Arsenic	75	1.00E+0	<2.00E-1	1.00E+0	1.0	9.91E-1
Germanium	72	<2.00E-1	<6.00E-1	<2.00E-1	1.0	<2.05E-1
Gallium	71	1.00E+0	<4.00E-1	1.00E+0	0.5	5.14E-1
Zinc	66	1.00E+1	<5.00E-1	1.00E+1	2.0	1.83E+1

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SSMS ANALYSIS OF SASS SAMPLES
IMPINGER - CONDENSATE E052081-HI/CD/0(#403/401) BLK CORR

              LINE USED  UNCORRECTED               CORRECTED
                 FOR       SAMPLE        BLANK      SAMPLE
  ELEMENT     ESTIMATE     VALUE         VALUE       VALUE     RSC   UGRAMS/M**3

Copper          63        7.00E+0     <1.00E+0    7.00E+0    1.0     6.84E+0
Nickel          58        1.00E+3     <3.00E-1    1.00E+3    1.0     1.02E+3
Cobalt          59        7.00E+1     <2.00E-1    7.00E+1    1.0     7.15E+1
Iron            57        1.50E+4      1.00E+0    1.50E+4    1.0     1.54E+4
Manganese       55        1.00E+3      1.50E-1    1.00E+3    1.0     1.02E+3
Chromium        53        1.00E+4     <1.50E-1    1.00E+4    1.0     1.02E+4
Vanadium        51        1.00E+1     <1.50E-1    1.00E+1    1.0     1.02E+1
Titanium        47        1.00E+1     <4.00E-1    1.00E+1    2.0     2.03E+1
Scandium        45       <5.00E-1      NC        <5.00E-1    0.7    <3.58E-1
Calcium         43        2.00E+1      1.00E+0    1.90E+1    0.3     2.68E+0
Potassium       41        1.00E+2      3.00E-1    9.97E+1    0.3     2.73E+1
Chlorine        35        7.00E+1      3.00E+0    6.70E+1    0.5     3.30E+1
Sulphur         33        2.00E+4      NC         2.00E+4    1.0     2.05E+4
Phosphorus      31/2      2.00E+1     <1.00E-1    2.00E+1    1.0     2.01E+1
Silicon         29/2      5.00E+1      5.00E+1    NG         0.7     NG
Aluminum        27/2      2.00E+1      1.00E+1    1.00E+1    1.0     6.25E+0
Magnesium       25/2      2.00E+1     <6.00E-1    2.00E+1    0.5     1.02E+1
Sodium          23/2      2.30E+4      2.00E+0    2.30E+4    3.0     7.06E+4
Fluorine        19       <2.00E-1     <2.00E-1   <2.00E-1    2.0    <4.10E-1
Boron           10        5.00E-1      1.50E-1    3.50E-1    0.3     1.03E-1
Beryllium        9        NC          <3.00E-2    NG         0.5     NG        A
Lithium          7       <3.00E+0     <1.50E-2   <3.00E+0    0.3    <9.22E-1


                                                      TOTALS:   1.19E+5
                                                               <2.40E+1


(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTIN


RW=1.52E-01  TV=2.03E+03  AV=1.00E+01  F=1.00E+00  NF=1.00E+00
TW=1.00E+00  AW=1.00E+00  M3=3.01E+01
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SSMS ANALYSIS OF SASS SAMPLES
FILTER E052081-PFA5/PFA6(#397/#398) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAM/M**3
Uranium	238	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<1.36E-1
Thorium	232	<5.00E-1	<6.00E-1	<5.00E-1	2.0	<2.72E-1
Bismuth	209	2.00E+1	<6.00E-1	2.00E+1	1.0	5.44E+0
Lead	208	3.80E+3	<1.00E+0	3.80E+3	1.0	1.03E+3
Thallium	205	<7.00E-1	<2.00E+0	<7.00E-1	2.0	<3.81E-1
Mercury	202	<2.00E+0	<2.00E+0	<2.00E+0	10.	<5.44E+0
Gold	197	<5.00E-1	NC	<5.00E-1	1.0	<1.36E-1
Platinum	195	<1.00E+0	NC	<1.00E+0	1.0	<2.72E-1
Iridium	193	<1.00E+0	NC	<1.00E+0	1.0	<2.72E-1
Osmium	190	<2.00E+0	NC	<2.00E+0	1.0	<5.44E-1
Rhenium	187	<1.00E+0	NC	<1.00E+0	1.0	<2.72E-1
Tungsten	184	<1.00E+0	<2.00E+0	<1.00E+0	1.0	<2.72E-1
Tantalum	181	<1.50E+1	<5.00E+0	<1.50E+1	1.0	<4.08E+0
Hafnium	178	<1.00E+0	NC	<1.00E+0	1.0	<2.72E-1
Lutecium	175	<5.00E-1	NC	<5.00E-1	1.0	<1.36E-1
Ytterbium	174	<1.00E+0	NC	<1.00E+0	1.0	<2.72E-1
Thulium	169	<5.00E-1	NC	<5.00E-1	1.0	<1.36E-1
Erbium	166	<1.00E+0	NC	<1.00E+0	1.0	<2.72E-1
Holmium	165	<5.00E-1	NC	<5.00E-1	1.0	<1.36E-1
Dysprosium	164	<2.00E+0	NC	<2.00E+0	1.0	<5.44E-1
Terbium	159	<3.00E-1	NC	<3.00E-1	1.0	<8.16E-2
Gadolinium	158	<1.00E+0	NC	<1.00E+0	1.0	<2.72E-1
Europium	153	<7.00E-1	NC	<7.00E-1	1.0	<1.91E-1
Samarium	152	<1.00E+0	NC	<1.00E+0	1.0	<2.72E-1
Neodymium	144	<3.00E+0	NC	<3.00E+0	1.0	<8.16E-1
Praseodymium	141	<3.00E-1	NC	<3.00E-1	1.0	<8.16E-2
Cerium	140	3.00E-1	<3.00E-1	3.00E-1	0.5	4.08E-2
Lanthanum	139	3.00E-1	NC	3.00E-1	1.0	8.16E-2
Barium	137	2.00E+2	<6.00E-1	2.00E+2	1.0	2.78E+1
Cesium	133	<3.00E-1	<3.00E-1	<3.00E-1	0.1	<1.22E-2
Iodine	127	<3.00E-1	1.00E+0	<3.00E-1	1.5	<1.22E-1
Tellurium	128	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<2.72E-1
Antimony	121	5.00E+1	<6.00E-1	5.00E+1	0.6	8.16E+0
Tin	118	7.00E+1	<1.00E+0	7.00E+1	1.0	1.83E+1
Indium	115	<5.00E-1	<3.00E-1	<5.00E-1	0.5	<6.80E-2
Cadmium	114	<1.00E+0	<1.00E+0	<1.00E+0	3.0	<8.16E-1
Silver	107	5.00E-1	<5.00E-1	5.00E-1	0.3	4.08E-2
Palladium	105	<1.00E+0	NC	<1.00E+0	1.0	<2.72E-1
Rhodium	103	<1.00E+1	NC	<1.00E+1	1.0	<2.72E+0
Ruthenium	101	<2.00E+0	NC	<2.00E+0	1.0	<5.44E-1
Molybdenum	98	7.00E+0	<1.00E+0	7.00E+0	0.5	9.53E-1
Niobium	93	<7.00E-1	<3.00E-1	<7.00E-1	1.0	<1.91E-1
Zirconium	90	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<1.36E-1
Yttrium	89	<2.00E-1	NC	<2.00E-1	1.0	<5.44E-2
Strontium	86	2.00E+0	<2.00E-1	2.00E+0	0.2	7.16E-2
Rubidium	85	1.00E+0	<3.00E-1	1.00E+0	0.2	5.44E-2
Bromine	79	3.00E+0	<5.00E-1	3.00E+0	2.5	1.71E+0
Selenium	80	<7.00E-1	7.00E+0	<7.00E-1	0.7	<1.33E-1
Arsenic	75	7.00E+0	<2.00E-1	7.00E+0	0.5	9.53E-1
Germanium	72	<1.00E+0	<6.00E-1	<1.00E+0	1.0	<2.72E-1
Gallium	71	5.00E-1	<4.00E-1	5.00E-1	0.5	NG
Zinc	66	7.00E+2	<5.00E-1	7.00E+2	1.0	1.88E+2

SSMS ANALYSIS OF SASS SAMPLES
FILTER E052081-PFA5/PFA6(#397/#398) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAM/M**3	
Copper	63	7.00E+1	<1.00E+0	7.00E+1	0.5	9.13E+0	
Nickel	58	3.00E+1	<3.00E-1	3.00E+1	0.5	3.15E+0	
Cobalt	59	2.00E+0	<2.00E-1	2.00E+0	0.5	1.39E-1	
Iron	57	7.00E+2	1.00E+0	6.99E+2	0.3	5.16E+1	
Manganese	55	5.00E+1	1.50E-1	4.98E+1	0.3	4.00E+0	
Chromium	53	1.00E+2	<1.50E-1	1.00E+2	0.3	7.77E+0	
Vanadium	51	5.00E-1	<1.50E-1	5.00E-1	0.3	3.28E-2	
Titanium	47	5.00E+0	<4.00E-1	5.00E+0	0.5	1.53E-2	
Scandium	45	<1.00E+0	NC	<1.00E+0	1.0	<2.72E-1	
Calcium	43	7.00E+2	1.00E+0	6.99E+2	0.5	6.86E+1	
Potassium	41	1.50E+3	3.00E-1	1.50E+3	0.1	3.42E+1	
Chlorine	35	7.00E+0	3.00E+0	4.00E+0	1.0	NG	
Sulphur	33	2.00E+3	NC	2.00E+3	1.0	3.58E+2	
Phosphorus	31/2	1.50E+3	<1.00E-1	1.50E+3	0.4	1.63E+2	
Silicon	29/2	1.50E+3	5.00E+1	1.45E+3	0.3	4.26E+1	
Aluminum	27/2	2.00E+2	1.00E+1	1.90E+2	0.3	3.48E-1	
Magnesium	25/2	2.00E+2	<6.00E-1	2.00E+2	0.1	3.58E+0	
Sodium	23/2	5.50E+4	2.00E+0	5.50E+4	0.3	4.41E+3	
Fluorine	19	<1.00E+0	<2.00E-1	<1.00E+0	2.0	<5.44E-1	
Boron	10	5.00E+0	1.50E-1	4.85E+0	0.3	NG	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	<5.00E+0	<1.50E-2	<5.00E+0	0.3	<4.08E-1	
					TOTALS:	6.44E+3 <2.24E+1	

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION

RW=1.02E-01 TV=1.00E+02 AV=1.00E+01 F=1.25E-01 NF=1.00E+00
TW=1.00E+00 AW=1.00E+00 M3=3.01E+01

SSMS ANALYSIS OF SASS SAMPLES
RESIN E052081-XR(#391) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAM/M**3
Uranium	238	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<2.25E+0
Thorium	232	<5.00E-1	<6.00E-1	<5.00E-1	2.0	<4.50E+0
Bismuth	209	7.00E-1	<6.00E-1	7.00E-1	1.0	3.15E+0
Lead	208	1.00E+0	<1.00E+0	1.00E+0	1.0	4.50E+0
Thallium	205	<7.00E-1	<2.00E+0	<7.00E-1	2.0	<6.30E+0
Mercury	202	<2.00E+0	<2.00E+0	<2.00E+0	10.	<9.00E+1
Gold	197	<5.00E-1	NC	<5.00E-1	1.0	<2.25E+0
Platinum	195	<1.00E+0	NC	<1.00E+0	1.0	<4.50E+0
Iridium	193	<1.00E+0	NC	<1.00E+0	1.0	<4.50E+0
Osmium	190	<2.00E+0	NC	<2.00E+0	1.0	<9.00E+0
Rhenium	187	<1.00E+0	NC	<1.00E+0	1.0	<4.50E+0
Tungsten	184	<1.00E+0	<2.00E+0	<1.00E+0	1.0	<4.50E+0
Tantalum	181	<1.50E+1	<5.00E+0	<1.50E+1	1.0	<6.75E+1
Hafnium	178	<1.00E+0	NC	<1.00E+0	1.0	<4.50E+0
Lutecium	175	<5.00E-1	NC	<5.00E-1	1.0	<2.25E+0
Ytterbium	174	<1.00E+0	NC	<1.00E+0	1.0	<4.50E+0
Thulium	169	<5.00E-1	NC	<5.00E-1	1.0	<2.25E+0
Erbium	166	<1.00E+0	NC	<1.00E+0	1.0	<4.50E+0
Holmium	165	<5.00E-1	NC	<5.00E-1	1.0	<2.25E+0
Dysprosium	164	<2.00E+0	NC	<2.00E+0	1.0	<9.00E+0
Terbium	159	<3.00E-1	NC	<3.00E-1	1.0	<1.35E+0
Gadolinium	158	<1.00E+0	NC	<1.00E+0	1.0	<4.50E+0
Europium	153	<7.00E-1	NC	<7.00E-1	1.0	<3.15E+0
Samarium	152	<1.00E+0	NC	<1.00E+0	1.0	<4.50E+0
Neodymium	144	<3.00E+0	NC	<3.00E+0	1.0	<1.35E+1
Praseodymium	141	<3.00E-1	NC	<3.00E-1	1.0	<1.35E+0
Cerium	140	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<6.75E-1
Lanthanum	139	<3.00E-1	NC	<3.00E-1	1.0	<1.35E+0
Barium	137	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<2.25E+0
Cesium	133	<3.00E-1	<3.00E-1	<3.00E-1	0.1	<2.02E-1
Iodine	127	<3.00E-1	1.00E+0	<3.00E-1	1.5	<2.02E+0
Tellurium	128	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<4.50E+0
Antimony	121	<5.00E-1	<6.00E-1	<5.00E-1	0.6	<1.35E+0
Tin	118	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<4.50E+0
Indium	115	<5.00E-1	<3.00E-1	<5.00E-1	0.5	<1.12E+0
Cadmium	114	<1.00E+0	<1.00E+0	<1.00E+0	3.0	<1.35E+1
Silver	107	<5.00E-1	<5.00E-1	<5.00E-1	0.3	<6.75E-1
Palladium	105	<1.00E+0	NC	<1.00E+0	1.0	<4.50E+0
Rhodium	103	<3.00E-1	NC	<3.00E-1	1.0	<1.35E+0
Ruthenium	101	<7.00E-1	NC	<7.00E-1	1.0	<3.15E+0
Molybdenum	98	3.00E+0	<1.00E+0	3.00E+0	0.5	1.35E-2
Niobium	93	<3.00E-1	<3.00E-1	<3.00E-1	1.0	<1.35E+0
Zirconium	90	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<2.25E+0
Yttrium	89	<2.00E-1	NC	<2.00E-1	1.0	<9.00E-1
Strontium	86	1.00E+0	<2.00E-1	1.00E+0	0.2	9.00E-1
Rubidium	85	<3.00E-1	<3.00E-1	<3.00E-1	0.2	<2.70E-1
Bromine	79	3.00E+0	<5.00E-1	3.00E+0	2.5	3.37E+1
Selenium	80	<5.00E-1	7.00E+0	<5.00E-1	0.7	<1.57E+0
Arsenic	75	<2.00E-1	<2.00E-1	<2.00E-1	0.5	<4.50E-1
Germanium	72	<1.00E+0	<6.00E-1	<1.00E+0	1.0	<4.50E+0
Gallium	71	<3.00E-1	<4.00E-1	<3.00E-1	0.5	<6.75E-1
Zinc	66	5.00E+1	<5.00E-1	5.00E+1	1.0	1.80E+2

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SSMS ANALYSIS OF SASS SAMPLES
RESIN E052081-XR(#391) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAM/M**3	
Copper	63	1.00E+1	<1.00E+0	1.00E+1	0.5	1.13E+1	
Nickel	58	2.00E+2	<3.00E-1	2.00E+2	0.5	2.93E+2	
Cobalt	59	2.00E+0	<2.00E-1	2.00E+0	0.5	2.25E+0	
Iron	57	7.00E+1	1.00E+0	6.90E+1	0.3	1.86E-1	
Manganese	55	3.00E+0	1.50E-1	2.85E+0	0.3	3.11E+0	
Chromium	53	5.00E+1	<1.50E-1	5.00E+1	0.3	5.40E+1	
Vanadium	51	2.00E-1	<1.50E-1	2.00E-1	0.3	1.35E-1	
Titanium	47	5.00E+0	<4.00E-1	5.00E+0	0.5	2.24E-2	
Scandium	45	<1.00E+0	NC	<1.00E+0	1.0	<4.50E+0	
Calcium	43	1.00E+2	1.00E+0	9.90E+1	0.5	4.44E-1	
Potassium	41	1.50E+2	3.00E-1	1.50E+2	0.1	4.50E+1	
Chlorine	35	2.00E+0	3.00E+0	<1.00E+0	1.0	<4.50E+0	
Sulphur	33	2.00E+2	NC	2.00E+2	1.0	2.26E+2	
Phosphorus	31/2	5.00E+0	<1.00E-1	5.00E+0	0.4	1.79E-2	
Silicon	29/2	1.50E+4	5.00E-1	1.50E+4	0.3	6.77E+3	
Aluminum	27/2	2.00E+2	1.00E+1	1.90E+2	0.3	NG	
Magnesium	25/2	5.00E+2	<6.00E-1	5.00E+2	0.1	1.35E+2	
Sodium	23/2	5.00E+2	2.00E+0	4.98E+2	0.3	2.71E+2	
Fluorine	19	<1.00E+0	<2.00E-1	<1.00E+0	2.0	<9.00E+0	
Boron	10	3.00E+0	1.50E-1	2.85E+0	0.3	7.67E-3	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	<2.00E+0	<1.50E-2	<2.00E+0	0.3	<2.70E+0	

TOTALS 8.04E+3
<3.31E+2

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION.

RW=1.00E-01 TV=1.00E+02 AV=1.00E+01 F=1.00E+00 NF=1.00E+00
TW=1.35E+02 AW=1.00E+00 M3=3.01E+01

SSMS ANALYSIS OF SASS SAMPLES

Pot residue E052081-BA(#406)

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/GRAM
Uranium	238	<2.00E-1	<6.00E-1	<2.00E-1	3.0	<8.71E-1
Thorium	232	<2.00E-1	<6.00E-1	<2.00E-1	3.0	<8.71E-1
Bismuth	209	7.00E-1	<6.00E-1	7.00E-1	1.0	1.02E+0
Lead	208	7.00E+3	<1.00E+0	7.00E+3	2.0	2.03E+4
Thallium	205	<1.00E-1	<2.00E+0	<1.00E-1	2.0	<2.90E-1
Mercury	202	<5.00E-1	<2.00E+0	<5.00E-1	10.	<7.26E+0
Gold	197	<1.00E-1	NC	<1.00E-1	1.0	<1.45E-1
Platinum	195	<2.00E-1	NC	<2.00E-1	1.0	<2.90E-1
Iridium	193	<2.00E-1	NC	<2.00E-1	1.0	<2.90E-1
Osmium	190	<5.00E-1	NC	<5.00E-1	1.0	<7.26E-1
Rhenium	187	<2.00E-1	NC	<2.00E-1	1.0	<2.90E-1
Tungsten	184	<2.00E-1	<2.00E+0	<2.00E-1	1.0	<2.90E-1
Tantalum	181	<1.00E-1	<5.00E+0	<1.00E-1	2.0	<2.90E-1
Hafnium	178	<2.00E-1	NC	<2.00E-1	5.0	<1.45E+0
Lutecium	175	<1.00E-1	NC	<1.00E-1	1.0	<1.45E-1
Ytterbium	174	<2.00E-1	NC	<2.00E-1	1.0	<2.90E-1
Thulium	169	<1.00E-1	NC	<1.00E-1	1.0	<1.45E-1
Erbium	166	<2.00E-1	NC	<2.00E-1	1.0	<2.90E-1
Holmium	165	<1.00E-1	NC	<1.00E-1	1.0	<1.45E-1
Dysprosium	164	<2.00E-1	NC	<2.00E-1	1.0	<2.90E-1
Terbium	159	<7.00E-2	NC	<7.00E-2	1.0	<1.02E-1
Gadolinium	158	<3.00E-1	NC	<3.00E-1	1.0	<4.35E-1
Europium	153	<2.00E-1	NC	<2.00E-1	1.0	<2.90E-1
Samarium	152	<3.00E-1	NC	<3.00E-1	1.0	<4.35E-1
Neodymium	144	<5.00E-1	NC	<5.00E-1	1.0	<7.26E-1
Praseodymium	141	7.00E-2	NC	7.00E-2	1.0	1.02E-1
Cerium	140	1.00E-1	<3.00E-1	1.00E-1	1.0	1.45E-1
Lanthanum	139	7.00E-2	NC	7.00E-2	1.0	1.02E-1
Barium	137	5.00E+2	<6.00E-1	5.00E+2	0.7	5.08E+2
Cesium	133	<7.00E-2	<3.00E-1	<7.00E-2	0.5	<5.08E-2
Iodine	127	1.00E-1	1.00E+0	<9.00E-1	1.5	<1.96E+0
Tellurium	128	<2.00E-1	<1.00E+0	<2.00E-1	1.0	<2.90E-1
Antimony	121	2.00E+1	<6.00E-1	2.00E+1	0.6	1.74E+1
Tin	118	1.00E+2	<1.00E+0	1.00E-2	1.0	1.45E+2
Indium	115	<1.00E+0	<3.00E-1	<1.00E+0	1.0	<1.45E+0
Cadmium	114	7.00E+0	<1.00E+0	7.00E+0	3.0	3.05E+1
Silver	107	3.00E-1	<5.00E-1	3.00E-1	1.0	4.35E-1
Palladium	105	<3.00E-1	NC	<3.00E-1	1.0	<4.35E-1
Rhodium	103	<3.00E+0	NC	<3.00E-0	1.0	<4.35E+0
Ruthenium	101	<3.00E+0	NC	<3.00E+0	1.0	<4.35E+0
Molybdenum	98	2.00E+2	<1.00E+0	2.00E+2	1.0	2.90E+2
Niobium	93	<5.00E-1	<3.00E-1	<5.00E-1	1.0	<7.26E-1
Zirconium	90	3.00E-1	<6.00E-1	3.00E-1	3.0	1.31E+0
Yttrium	89	5.00E-2	NC	5.00E-2	1.0	7.26E-2
Strontium	86	7.00E+1	<2.00E-1	7.00E+1	0.5	5.08E+1
Rubidium	85	5.00E-1	<3.00E-1	5.00E-1	0.5	3.63E-1
Bromine	79	5.00E+0	<5.00E-1	5.00E+0	4.0	2.90E+1
Selenium	80	<7.00E-1	7.00E+0	<7.00E-1	2.0	<2.03E+0
Arsenic	75	<4.00E+0	<2.00E-1	<4.00E+0	1.0	<5.80E+0
Germanium	72	<1.00E-1	<6.00E-1	<1.00E-1	1.0	<1.45E-1
Gallium	71	2.00E-1	<4.00E-1	2.00E-1	0.6	1.74E-1
Zinc	66	2.50E+4	<5.00E-1	2.50E-4	2.0	7.26E+4

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SSMS ANALYSIS OF SASS SAMPLES
 Pot residue E052081-BA(#406)

              LINE USED  UNCORRECTED                CORRECTED
                 FOR       SAMPLE        BLANK       SAMPLE
  ELEMENT      ESTIMATE     VALUE        VALUE        VALUE    RSC  UGRAMS/GRAM

 Copper           63       7.00E+2     <1.00E+0     7.00E+2   1.0    1.02E+3
 Nickel           58       5.00E+1     <3.00E-1     5.00E+1   1.0    7.26E+1
 Cobalt           59       2.00E+1     <2.00E-1     2.00E+1   1.0    2.90E+1
 Iron             57       5.00E+3      1.00E+0     5.00E+3   1.0    7.25E+3
 Manganese        55       1.00E+3      1.50E-1     1.00E+3   1.0    1.45E+3
 Chromium         53       3.00E+2     <1.50E-1     3.00E+2   1.0    4.35E+2
 Vanadium         51       1.00E+0     <1.50E-1     1.00E+0   1.0    1.45E+0
 Titanium         47       3.00E+2     <4.00E-1     3.00E+2   2.0    8.71E+2
 Scandium         45      <2.00E-1      NC         <2.00E-1   0.7   <2.03E-1
 Calcium          43       6.00E+4      1.00E+0     6.00E+4   0.3    2.61E+4
 Potassium        41       1.00E+3      3.00E-1     1.00E+3   0.3    4.35E+2
 Chlorine         35       5.00E+3      3.00E+0     5.00E+3   0.5    3.63E+3
 Sulphur          33       5.00E+3      NC          5.00E+3   1.0    7.26E+3
 Phosphorus       31/2     5.00E+4     <1.00E-1     5.00E+4   1.0    7.26E+4
 Silicon          29/2     3.00E+2      5.00E+1     2.50E+2   0.7    2.54E+2
 Aluminum         27/2     1.00E+3      1.00E+1     9.90E+2   1.0    1.44E+3
 Magnesium        25/2     5.00E+4     <6.00E-1     5.00E+4   0.5    3.63E+4
 Sodium           23/2     2.50E+3      2.00E+0     2.50E+3   3.0    1.09E+4
 Fluorine         19      <3.00E-1     <2.00E-1    <3.00E-1   2.0   <8.71E-1
 Boron            10       2.00E+2      1.50E-1     2.00E+2   0.3    8.70E+1
 Beryllium         9       NC          <3.00E-2     NG        0.5    NG         A
 Lithium           7       3.00E+1     <1.50E-2     3.00E+1   0.3    1.31E+1

                                                     TOTALS:   2.64E+5
                                                              <3.90E+1

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION

RW=1.45E-01  TV=1.00E+02  AV=1.00E+01  F=1.00E+00  NF=1.00E+00
TW=1.00E+00  AW=1.00E+00  M3=1.00E+00
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SSMS ANALYSIS OF SASS SAMPLES
DILUTION FILTER E052081-DF16/DF17(#399/#400) BLK CORR

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3
Uranium	238	<2.00E-1	<6.00E-1	<2.00E-1	3.0	<1.70E-1
Thorium	232	<2.00E-1	<6.00E-1	<2.00E-1	3.0	<1.70E-1
Bismuth	209	1.00E+1	<6.00E-1	1.00E+1	1.0	2.83E+0
Lead	208	1.20E+4	<1.00E+0	1.20E+4	2.0	6.78E+3
Thallium	205	<1.00E-1	<2.00E+0	<1.00E-1	2.0	<5.65E-2
Mercury	202	<5.00E-1	<2.00E+0	<5.00E-1	10.	<1.41E+0
Gold	197	<1.00E-1	NC	<1.00E-1	1.0	<2.83E-2
Platinum	195	<2.00E-1	NC	<2.00E-1	1.0	<5.65E-2
Iridium	193	<2.00E-1	NC	<2.00E-1	1.0	<5.65E-2
Osmium	190	<5.00E-1	NC	<5.00E-1	1.0	<1.41E-1
Rhenium	187	<2.00E-1	NC	<2.00E-1	1.0	<5.65E-2
Tungsten	184	<2.00E-1	<2.00E+0	<2.00E-1	1.0	<5.65E-2
Tantalum	181	<1.00E+0	<5.00E+0	<1.00E+0	2.0	<5.65E-1
Hafnium	178	<2.00E-1	NC	<2.00E-1	5.0	<2.83E-1
Lutecium	175	<1.00E-1	NC	<1.00E-1	1.0	<2.83E-2
Ytterbium	174	<2.00E-1	NC	<2.00E-1	1.0	<5.65E-2
Thulium	169	<1.00E-1	NC	<1.00E-1	1.0	<2.83E-2
Erbium	166	<2.00E-1	NC	<2.00E-1	1.0	<5.65E-2
Holmium	165	<1.00E-1	NC	<1.00E-1	1.0	<2.83E-2
Dysprosium	164	<5.00E-1	NC	<5.00E-1	1.0	<1.41E-1
Terbium	159	<7.00E-2	NC	<7.00E-2	1.0	<1.98E-2
Gadolinium	158	<2.00E-1	NC	<2.00E-1	1.0	<5.65E-2
Europium	153	<1.00E-1	NC	<1.00E-1	1.0	<2.83E-2
Samarium	152	<5.00E-1	NC	<5.00E-1	1.0	<1.41E-1
Neodymium	144	<7.00E-1	NC	<7.00E-1	1.0	<1.98E-1
Praseodymium	141	<7.00E-2	NC	<7.00E-2	1.0	<1.98E-2
Cerium	140	7.00E-2	<3.00E-1	7.00E-2	1.0	1.98E-2
Lanthanum	139	7.00E-2	NC	7.00E-2	1.0	1.98E-2
Barium	137	7.00E+2	<6.00E-1	7.00E+2	0.7	3.05E+1
Cesium	133	<7.00E-2	<3.00E-1	<7.00E-2	0.5	<9.89E-3
Iodine	127	<7.00E-2	1.00E+0	<7.00E-2	1.5	<2.97E-2
Tellurium	128	<2.00E-1	<1.00E+0	<2.00E-1	1.0	<5.65E-2
Antimony	121	2.00E+2	<6.00E-1	2.00E+2	0.5	3.39E+1
Tin	118	1.00E+2	<1.00E+0	1.00E+2	1.0	2.72E+1
Indium	115	<7.00E-2	<3.00E-1	<7.00E-2	1.0	<1.98E-2
Cadmium	114	<2.00E-1	<1.00E+0	<2.00E-1	3.0	<1.70E-1
Silver	107	2.00E+0	<5.00E-1	2.00E+0	1.0	5.65E-1
Palladium	105	<2.00E-1	NC	<2.00E-1	1.0	<5.65E-2
Rhodium	103	<2.00E+0	NC	<2.00E+0	1.0	<5.65E-1
Ruthenium	101	<5.00E-1	NC	<5.00E-1	1.0	<1.41E-1
Molybdenum	98	5.00E+0	<1.00E+0	5.00E+0	1.0	1.41E+0
Niobium	93	<7.00E-1	<3.00E-1	<7.00E-1	1.0	<1.98E-1
Zirconium	90	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<8.48E-2
Yttrium	89	<5.00E-2	NC	<5.00E-2	1.0	<1.41E-2
Strontium	86	5.00E+0	<2.00E-1	5.00E+0	0.5	1.67E-1
Rubidium	85	5.00E+0	<3.00E-1	5.00E+0	0.5	3.83E-1
Bromine	79	7.00E+0	<5.00E-1	7.00E+0	4.0	7.91E+0
Selenium	80	<7.00E-1	7.00E+0	<7.00E-1	2.0	<3.96E-1
Arsenic	75	2.00E+1	<2.00E-1	2.00E+1	1.0	5.65E+0
Germanium	72	<2.00E-1	<6.00E-1	<2.00E-1	1.0	<5.65E-2
Gallium	71	5.00E-1	<4.00E-1	5.00E-1	0.6	8.48E-2
Zinc	66	1.50E+3	<5.00E-1	1.50E+3	2.0	8.10E+2

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SSMS ANALYSIS OF SASS SAMPLES
DILUTION FILTER E052081-DF16/DF17(#399/#400) BLK CORR

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3	
Copper	63	1.00E+2	<1.00E+0	1.00E+2	1.0	2.29E+1	
Nickel	58	7.00E+1	<3.00E-1	7.00E+1	1.0	1.84E+1	
Cobalt	59	5.00E+1	<2.00E-1	5.00E+1	1.0	1.40E+1	
Iron	57	1.00E+3	1.00E-0	9.99E-2	1.0	2.71E+2	
Manganese	55	5.00E+1	1.50E-1	4.98E+1	1.0	1.33E+1	
Chromium	53	2.00E+1	<1.50E-1	2.00E+1	1.0	5.57E+0	
Vanadium	51	3.00E+0	<1.50E-1	3.00E+0	1.0	8.15E-1	
Titanium	47	1.00E-2	<4.00E-1	1.00E+2	2.0	5.57E+1	
Scandium	45	<5.00E-1	NC	<5.00E-1	0.7	<9.89E-2	
Calcium	43	1.50E+4	1.00E-0	1.50E-4	0.3	1.19E+3	
Potassium	41	5.00E+3	3.00E-1	5.00E+3	0.3	1.54E+2	
Chlorine	35	2.00E+2	3.00E-0	1.97E+2	0.5	NG	
Sulphur	33	2.00E+4	NC	2.00E+4	1.0	5.54E+3	
Phosphorus	31/2	1.50E+3	<1.00E-1	1.50E+3	1.0	4.17E+2	
Silicon	29/2	3.00E+3	5.00E+1	2.95E+3	0.7	NG	
Aluminum	27/2	1.00E+3	1.00E+1	9.90E+2	1.0	NG	
Magnesium	25/2	1.50E+3	<6.00E-1	1.50E+3	0.5	2.10E+2	
Sodium	23/2	7.00E+3	2.00E+0	7.00E+3	3.0	2.69E+3	
Fluorine	19	<2.00E-1	<2.00E-1	<2.00E-1	2.0	<1.13E-1	
Boron	10	2.00E+1	1.50E-1	1.99E+1	0.3	8.81E-2	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	<7.00E+0	<1.50E-2	<7.00E-0	0.3	<5.93E-1	
					TOTALS:	1.83E+4 <6.46E+0	

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION.

RW=1.06E-01 TV=1.00E+02 AV=1.00E+01 F=1.25E-01 NF=2.00E+00
TW=1.00E+00 AW=1.00E+00 M3=3.01E+01

SSMS ANALYSIS OF SASS SAMPLES
IMPINGER + CONDENSATE HI/CD/O-E062581 (#426/#427) BLK CORR

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3
Uranium	238	<5.00E-2	<6.00E-1	<5.00E-2	3.0	<4.36E-1
Thorium	232	<5.00E-2	<6.00E-1	<5.00E-2	3.0	<4.36E-1
Bismuth	209	<5.00E-2	<6.00E-1	<5.00E-2	1.0	<1.45E-1
Lead	208	1.00E-1	<1.00E+0	1.00E-1	2.0	5.82E-1
Thallium	205	<5.00E-2	<2.00E+0	<5.00E-2	2.0	<2.91E-1
Mercury	202	<1.00E-1	<2.00E+0	<1.00E-1	10.	<2.91E+0
Gold	197	<5.00E-2	NC	<5.00E-2	1.0	<1.45E-1
Platinum	195	<1.00E-1	NC	<1.00E-1	1.0	<2.91E-1
Iridium	193	<1.00E-1	NC	<1.00E-1	1.0	<2.91E-1
Osmium	190	<1.00E-1	NC	<1.00E-1	1.0	<2.91E-1
Rhenium	187	<7.00E-2	NC	<7.00E-2	1.0	<2.04E-1
Tungsten	184	<1.00E-1	<2.00E+0	<1.00E-1	1.0	<2.91E-1
Tantalum	181	<5.00E+0	<5.00E+0	<5.00E+0	2.0	<2.91E+1
Hafnium	178	<1.00E-1	NC	<1.00E-1	5.0	<1.45E+0
Lutecium	175	<3.00E-2	NC	<3.00E-2	1.0	<8.72E-2
Ytterbium	174	<1.00E-1	NC	<1.00E-1	1.0	<2.91E-1
Thulium	169	<3.00E-2	NC	<3.00E-2	1.0	<8.72E-2
Erbium	166	<1.00E-1	NC	<1.00E-1	1.0	<2.91E-1
Holmium	165	<3.00E-2	NC	<3.00E-2	1.0	<8.72E-2
Dysprosium	164	<1.00E-1	NC	<1.00E-1	1.0	<2.91E-1
Terbium	159	<3.00E-2	NC	<3.00E-2	1.0	<8.72E-2
Gadolinium	158	<1.00E-1	NC	<1.00E-1	1.0	<2.91E-1
Europium	153	<7.00E-2	NC	<7.00E-2	1.0	<2.04E-1
Samarium	152	<1.00E-1	NC	<1.00E-1	1.0	<2.91E-1
Neodymium	144	<2.00E-1	NC	<2.00E-1	1.0	<5.82E-1
Praseodymium	141	<3.00E-2	NC	<3.00E-2	1.0	<8.72E-2
Cerium	140	<3.00E-2	<3.00E-1	<3.00E-2	1.0	<8.72E-2
Lanthanum	139	<3.00E-2	NC	<3.00E-2	1.0	<8.72E-2
Barium	137	<5.00E-2	<6.00E-1	<5.00E-2	1.0	<1.45E-1
Cesium	133	<3.00E-2	<3.00E-1	<3.00E-2	0.5	<4.36E-2
Iodine	127	<3.00E-2	1.00E+0	<3.00E-2	1.5	<1.31E-1
Tellurium	128	<1.00E-1	<1.00E+0	<1.00E-1	1.0	<2.91E-1
Antimony	121	<5.00E-2	<6.00E-1	<5.00E-2	0.6	<8.72E-2
Tin	118	3.00E+0	<1.00E+0	3.00E-0	1.0	8.72E+0
Indium	115	<2.00E-2	<3.00E-1	<2.00E-2	1.0	<5.82E-2
Cadmium	114	<1.00E-1	<1.00E+0	<1.00E-1	3.0	<8.72E-1
Silver	107	7.00E-2	<5.00E-1	7.00E-2	1.0	2.04E-1
Palladium	105	<7.00E-2	NC	<7.00E-2	1.0	<2.04E-1
Rhodium	103	<2.00E-2	NC	<2.00E-2	1.0	<5.82E-2
Ruthenium	101	<7.00E-2	NC	<7.00E-2	1.0	<2.04E-1
Molybdenum	98	3.00E+0	<1.00E-0	3.00E+0	1.0	8.38E+0
Niobium	93	2.00E-2	<3.00E-1	2.00E-2	1.0	5.82E-2
Zirconium	90	<3.00E-2	<6.00E-1	<3.00E-2	3.0	<2.62E-1
Yttrium	89	<2.00E-2	NC	<2.00E-2	1.0	<5.82E-2
Strontium	86	3.00E-2	<2.00E-1	3.00E-2	0.5	2.99E-2
Rubidium	85	<5.00E-2	<3.00E-1	<5.00E-2	0.5	<7.27E-2
Bromine	79	5.00E-2	<5.00E-1	5.00E-2	4.0	NG
Selenium	80	<2.00E+0	7.00E-0	<2.00E+0	2.0	<1.16E+1
Arsenic	75	5.00E-1	<2.00E-1	5.00E-1	1.0	1.42E+0
Germanium	72	<5.00E-2	<6.00E-1	<5.00E-2	1.0	<1.45E-1
Gallium	71	<7.00E-2	<4.00E-1	<7.00E-2	0.6	<1.22E-1
Zinc	66	3.00E-1	<5.00E-1	3.00E-1	2.0	2.47E-2

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SSMS ANALYSIS OF SASS SAMPLES
IMPINGER - CONDENSATE HI/CD/O-E062581 (#426/#427) BLK CORR

             LINE USED  UNCORRECTED              CORRECTED
               FOR        SAMPLE       BLANK      SAMPLE
  ELEMENT    ESTIMATE     VALUE        VALUE      VALUE    RSC  UGRAMS/M**3

Copper          63       1.00E+0    <1.00E+0   1.00E+0   1.0    2.56E+0
Nickel          58       7.00E+1    <3.00E-1   7.00E+1   1.0    2.03E+2
Cobalt          59       1.00E+0    <2.00E-1   1.00E+0   1.0    2.74E+0
Iron            57       3.00E+2     1.00E+0   2.99E+2   1.0    8.68E+2
Manganese       55       7.00E+0     1.50E-1   6.85E+0   1.0    1.99E+1
Chromium        53       1.00E+2    <1.50E-1   1.00E+2   1.0    2.91E+2
Vanadium        51       2.00E-1    <1.50E-1   2.00E-1   1.0    5.71E-1
Titanium        47      <1.00E-1    <4.00E-1  <1.00E-1   2.0   <5.82E-1
Scandium        45      <2.00E-1     NC       <2.00E-1   0.7   <4.07E-1
Calcium         43       5.00E+0     1.00E+0   4.00E+0   0.3    2.21E-1
Potassium       41       2.00E+1     3.00E-1   1.97E+1   0.3    1.38E+1
Chlorine        35       2.00E+1     3.00E+0   1.70E+1   0.5    2.33E+1
Sulphur         33       5.00E+3     NC        5.00E+3   1.0    1.45E+4
Phosphorus      31/2     5.00E+0    <1.00E-1   5.00E+0   1.0    1.41E+1
Silicon         29/2     1.00E+1     5.00E+1  <4.00E+1   0.7   <8.14E+1
Aluminum        27/2     5.00E+0     1.00E+1  <5.00E+0   1.0   <1.45E+1
Magnesium       25/2     3.00E+0    <6.00E-1   3.00E+0   0.5    4.36E+0
Sodium          23/2     2.50E+4     2.00E+0   2.50E+4   3.0    2.18E+5
Fluorine        19      <2.00E-1    <2.00E-1  <2.00E-1   2.0   <1.16E+0
Boron           10       3.00E+0     1.50E-1   2.85E+0   0.3    2.48E+0
Beryllium        9       NC         <3.00E-2   NG        0.5    NG        A
Lithium          7       NC         <1.50E-2   NG        0.3    NG        A


                                                     TOTALS    2.34E+5
                                                              <1.52E+2


(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION


RW=3.19E-01  TV=2.65E+03  AV=1.00E+01  F=1.00E+00  NF=1.00E+00
TW=1.00E+00  AW=1.00E+00  M3=2.91E+01
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SSMS ANALYSIS OF SASS SAMPLES
FILTER PFA1/12-E062581 (#439) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3
Uranium	238	<2.00E-1	<6.00E-1	<2.00E-1	3.0	<2.66E-1
Thorium	232	<2.00E-1	<6.00E-1	<2.00E-1	3.0	<2.66E-1
Bismuth	209	7.00E-1	<6.00E-1	7.00E-1	1.0	3.10E-1
Lead	208	7.00E+4	<1.00E+0	7.00E+4	2.0	6.20E+4
Thallium	205	<1.00E-1	<2.00E+0	<1.00E-1	2.0	<8.85E-2
Mercury	202	<3.00E-1	<2.00E+0	<3.00E-1	10.	<1.33E+0
Gold	197	<1.00E-1	NC	<1.00E-1	1.0	<4.43E-2
Platinum	195	<3.00E-1	NC	<3.00E-1	1.0	<1.33E-1
Iridium	193	<2.00E-1	NC	<2.00E-1	1.0	<8.85E-2
Osmium	190	<3.00E-1	NC	<3.00E-1	1.0	<1.33E-1
Rhenium	187	<2.00E-1	NC	<2.00E-1	1.0	<8.85E-2
Tungsten	184	5.00E-1	<2.00E+0	5.00E-1	1.0	2.21E-1
Tantalum	181	<3.00E+0	<5.00E+0	<3.00E-0	2.0	<2.66E+0
Hafnium	178	<3.00E-1	NC	<3.00E-1	5.0	<6.64E-1
Lutecium	175	<1.00E-1	NC	<1.00E-1	1.0	<4.43E-2
Ytterbium	174	<3.00E-1	NC	<3.00E-1	1.0	<1.33E-1
Thulium	169	<2.00E-1	NC	<2.00E-1	1.0	<8.85E-2
Erbium	166	<2.00E-1	NC	<2.00E-1	1.0	<8.85E-2
Holmium	165	<1.00E-1	NC	<1.00E-1	1.0	<4.43E-2
Dysprosium	164	<3.00E-1	NC	<3.00E-1	1.0	<1.33E-1
Terbium	159	<7.00E-2	NC	<7.00E-2	1.0	<3.10E-2
Gadolinium	158	<3.00E-1	NC	<3.00E-1	1.0	<1.33E-1
Europium	153	<2.00E-1	NC	<2.00E-1	1.0	<8.85E-2
Samarium	152	<3.00E-1	NC	<3.00E-1	1.0	<1.33E-1
Neodymium	144	<5.00E-1	NC	<5.00E-1	1.0	<2.21E-1
Praseodymium	141	<7.00E-2	NC	<7.00E-2	1.0	<3.10E-2
Cerium	140	2.00E-1	<3.00E-1	2.00E-1	1.0	8.85E-2
Lanthanum	139	5.00E-1	NC	5.00E-1	1.0	2.21E-1
Barium	137	7.00E+2	<6.00E-1	7.00E-2	1.0	2.82E+2
Cesium	133	<7.00E-2	<3.00E-1	<7.00E-2	0.5	<1.55E-2
Iodine	127	1.00E+0	1.00E+0	NG	1.5	NG
Tellurium	128	<2.00E-1	<1.00E+0	<2.00E-1	1.0	<8.85E-2
Antimony	121	1.00E+1	<6.00E-1	1.00E-1	0.6	2.66E+0
Tin	118	2.00E+2	<1.00E+0	2.00E+2	1.0	8.77E+1
Indium	115	1.00E+1	<3.00E-1	1.00E+1	1.0	4.43E+0
Cadmium	114	3.00E+1	<1.00E+0	3.00E-1	3.0	3.98E+1
Silver	107	2.00E+0	<5.00E-1	2.00E-0	1.0	8.85E-1
Palladium	105	<3.00E-1	NC	<3.00E-1	1.0	<1.33E-1
Rhodium	103	<5.00E-1	NC	<5.00E-1	1.0	<2.21E-1
Ruthenium	101	<3.00E-1	NC	<3.00E-1	1.0	<1.33E-1
Molybdenum	98	7.00E+1	<1.00E-0	7.00E+1	1.0	3.10E+1
Niobium	93	<5.00E-2	<3.00E-1	<5.00E-2	1.0	<2.21E-2
Zirconium	90	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<1.33E-1
Yttrium	89	<5.00E-2	NC	<5.00E-2	1.0	<2.21E-2
Strontium	86	1.00E+1	<2.00E-1	1.00E+1	0.5	2.17E+0
Rubidium	85	2.00E+0	<3.00E-1	2.00E+0	0.5	4.43E-1
Bromine	79	1.00E-1	<5.00E-1	1.00E-1	4.0	NG
Selenium	80	<3.00E-1	7.00E+0	<3.00E-1	2.0	<2.66E-1
Arsenic	75	3.00E+0	<2.00E-1	3.00E+0	1.0	1.33E+0
Germanium	72	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<2.21E-1
Gallium	71	<1.00E-1	<4.00E-1	<1.00E-1	0.6	<2.66E-2
Zinc	66	5.00E+4	<5.00E-1	5.00E-4	2.0	4.43E+4

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SSMS ANALYSIS OF SASS SAMPLES
FILTER PFA1/12-E062581 (#439) BLANK CORRECTED

             LINE USED  UNCORRECTED              CORRECTED
                FOR       SAMPLE       BLANK      SAMPLE
  ELEMENT    ESTIMATE     VALUE        VALUE      VALUE    RSC  UGRAMS/M**3

Copper          63       1.50E+3     <1.00E+0   1.50E+3   1.0    6.64E+2
Nickel          58       3.00E-2     <3.00E-1   3.00E+2   1.0    1.32E+2
Cobalt          59       2.00E+0     <2.00E-1   2.00E+0   1.0    7.48E-1
Iron            57       1.00E+4      1.00E+0   1.00E+4   1.0    4.42E+3
Manganese       55       3.00E+2      1.50E-1   3.00E+2   1.0    1.33E+2
Chromium        53       1.00E+2     <1.50E-1   1.00E+2   1.0    4.38E+1
Vanadium        51       2.00E+0     <1.50E-1   2.00E+0   1.0    8.77E-1
Titanium        47       3.00E+1     <4.00E-1   3.00E+1   2.0    2.59E+1
Scandium        45      <3.00E-1      NC       <3.00E-1   0.7   <9.29E-2
Calcium         43       1.20E+4      1.00E+0   1.20E+4   0.3    1.57E+3
Potassium       41       3.00E+3      3.00E-1   3.00E+3   0.3    3.91E+2
Chlorine        35       1.20E+4      3.00E+0   1.20E+4   0.5    2.64E+3
Sulphur         33       5.00E+2      NC        5.00E+2   1.0    2.87E+1
Phosphorus      31/2     2.00E+4     <1.00E-1   2.00E+4   1.0    8.85E+3
Silicon         29/2     5.00E+2      5.00E+1   4.50E+2   0.7    6.10E+1
Aluminum        27/2     2.50E+2      1.00E+1   2.40E+2   1.0    9.05E+1
Magnesium       25/2     5.00E+4     <6.00E-1   5.00E+4   0.5    1.11E+4
Sodium          23/2     1.20E+4      2.00E+0   1.20E+4   3.0    1.58E+4
Fluorine        19      <1.00E+0     <2.00E-1  <1.00E+0   2.0   <8.85E-1
Boron           10       1.00E+2      1.50E-1   9.99E+1   0.3    1.24E+1
Beryllium        9       NC          <3.00E-2   NG        0.5    NG        A
Lithium          7       5.00E+2     <1.50E-2   5.00E+2   0.3    6.61E+1

                                                   TOTALS:   1.53E+5
                                                            <9.18E+0

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION

RW=1.61E-01  TV=1.00E+02  AV=1.00E+01  F=1.25E-01  NF=1.00E+00
TW=1.00E+00  AW=1.00E+00  M3=2.91E+01
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SSMS ANALYSIS OF SASS SAMPLES
CYCLONE CATCH 3C/10C-E062581 (#437/438)

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3
Uranium	238	<2.00E-1	<6.00E-1	<2.00E-1	3.0	<5.85E-1
Thorium	232	<2.00E-1	<6.00E-1	<2.00E-1	3.0	<5.85E-1
Bismuth	209	<1.00E-1	<6.00E-1	<1.00E-1	1.0	<9.74E-2
Lead	208	1.00E+3	<1.00E+0	1.00E+3	2.0	1.95E+3
Thallium	205	<1.00E-1	<2.00E+0	<1.00E-1	2.0	<1.95E-1
Mercury	202	<3.00E-1	<2.00E+0	<3.00E-1	10.	<2.92E+0
Gold	197	<1.00E-1	NC	<1.00E-1	1.0	<9.74E-2
Platinum	195	<3.00E-1	NC	<3.00E-1	1.0	<2.92E-1
Iridium	193	<2.00E-1	NC	<2.00E-1	1.0	<1.95E-1
Osmium	190	<3.00E-1	NC	<3.00E-1	1.0	<2.92E-1
Rhenium	187	<2.00E-1	NC	<2.00E-1	1.0	<1.95E-1
Tungsten	184	<3.00E-1	<2.00E+0	<3.00E-1	1.0	<2.92E-1
Tantalum	181	<7.00E-1	<5.00E+0	<7.00E-1	2.0	<1.36E+0
Hafnium	178	<3.00E-1	NC	<3.00E-1	5.0	<1.46E+0
Lutecium	175	<1.00E-1	NC	<1.00E-1	1.0	<9.74E-2
Ytterbium	174	<3.00E-1	NC	<3.00E-1	1.0	<2.92E-1
Thulium	169	<2.00E-1	NC	<2.00E-1	1.0	<1.95E-1
Erbium	166	<2.00E-1	NC	<2.00E-1	1.0	<1.95E-1
Holmium	165	<1.00E-1	NC	<1.00E-1	1.0	<9.74E-2
Dysprosium	164	<1.00E+0	NC	<1.00E+0	1.0	<9.74E-1
Terbium	159	<1.00E-1	NC	<1.00E-1	1.0	<9.74E-2
Gadolinium	158	<3.00E-1	NC	<3.00E-1	1.0	<2.92E-1
Europium	153	<2.00E-1	NC	<2.00E-1	1.0	<1.95E-1
Samarium	152	<3.00E-1	NC	<3.00E-1	1.0	<2.92E-1
Neodymium	144	<5.00E-1	NC	<5.00E-1	1.0	<4.87E-1
Praseodymium	141	<7.00E-2	NC	<7.00E-2	1.0	<6.82E-2
Cerium	140	1.00E-1	<3.00E-1	1.00E-1	1.0	9.74E-2
Lanthanum	139	1.00E-1	NC	1.00E-1	1.0	9.74E-2
Barium	137	7.00E+2	<6.00E-1	7.00E+2	1.0	6.82E+2
Cesium	133	<7.00E-2	<3.00E-1	<7.00E-2	0.5	<3.41E-2
Iodine	127	5.00E-1	1.00E+0	<5.00E-1	1.5	<7.31E-1
Tellurium	128	<2.00E-1	<1.00E+0	<2.00E-1	1.0	<1.95E-1
Antimony	121	1.00E+0	<6.00E-1	1.00E+0	0.6	5.85E-1
Tin	118	1.00E+1	<1.00E+0	1.00E+1	1.0	9.74E+0
Indium	115	2.00E-1	<3.00E-1	2.00E-1	1.0	1.95E-1
Cadmium	114	1.00E+0	<1.00E+0	1.00E+0	3.0	2.92E+0
Silver	107	3.00E-1	<5.00E-1	3.00E-1	1.0	2.92E-1
Palladium	105	<2.00E-1	NC	<2.00E-1	1.0	<1.95E-1
Rhodium	103	<5.00E-1	NC	<5.00E-1	1.0	<4.87E-1
Ruthenium	101	<3.00E-1	NC	<3.00E-1	1.0	<2.92E-1
Molybdenum	98	2.00E+1	<1.00E-0	2.00E-1	1.0	1.95E+1
Niobium	93	<5.00E-2	<3.00E-1	<5.00E-2	1.0	<4.87E-2
Zirconium	90	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<2.92E-1
Yttrium	89	<5.00E-2	NC	<5.00E-2	1.0	<4.87E-2
Strontium	86	5.00E+1	<2.00E-1	5.00E+1	0.5	2.44E+1
Rubidium	85	5.00E-2	<3.00E-1	5.00E-2	0.5	2.44E-2
Bromine	79	1.00E-1	<5.00E-1	1.00E-1	4.0	3.90E-1
Selenium	80	<3.00E-1	7.00E+0	<3.00E-1	2.0	<5.85E-1
Arsenic	75	1.00E+0	<2.00E-1	1.00E+0	1.0	9.74E-1
Germanium	72	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<4.87E-1
Gallium	71	<1.00E-1	<4.00E-1	<1.00E-1	0.6	<5.85E-2
Zinc	66	5.00E+3	<5.00E-1	5.00E+3	2.0	9.74E+3

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SSMS ANALYSIS OF SASS SAMPLES
CYCLONE CATCH 3C/10C-E062581 (#437/438)

              LINE USED  UNCORRECTED                CORRECTED
                 FOR       SAMPLE       BLANK        SAMPLE
   ELEMENT    ESTIMATE      VALUE       VALUE         VALUE     RSC  UGRAMS/M**3

Copper           63       2.00E+2    <1.00E+0     2.00E+2    1.0    1.95E+2
Nickel           58       5.00E+1    <3.00E-1     5.00E+1    1.0    4.87E+1
Cobalt           59       5.00E-1    <2.00E-1     5.00E-1    1.0    4.87E-1
Iron             57       5.00E+3     1.00E-0     5.00E+3    1.0    4.87E+3
Manganese        55       2.00E+2     1.50E-1     2.00E+2    1.0    1.95E+2
Chromium         53       1.00E+2    <1.50E-1     1.00E+2    1.0    9.74E+1
Vanadium         51       2.00E+0    <1.50E-1     2.00E+0    1.0    1.95E+0
Titanium         47       1.00E+2    <4.00E-1     1.00E+2    2.0    1.95E+2
Scandium         45      <3.00E-1     NC         <3.00E-1    0.7   <2.05E-1
Calcium          43       3.00E+4     1.00E-0     3.00E+4    0.3    8.77E+3
Potassium        41       3.00E+2     3.00E-1     3.00E+2    0.3    8.76E+1
Chlorine         35       3.00E+1     3.00E-0     2.70E+1    0.5    1.32E+1
Sulphur          33       2.00E+2     NC          2.00E+2    1.0    1.95E+2
Phosphorus      31/2      1.00E+4    <1.00E-1     1.00E+4    1.0    9.74E+3
Silicon         29/2      1.00E+3     5.00E+1     9.50E+2    0.7    6.48E+2
Aluminum        27/2      1.00E+3     1.00E+1     9.90E+2    1.0    9.64E+2
Magnesium       25/2      1.00E+5    <6.00E-1     1.00E+5    0.5    4.87E+4
Sodium          23/2      1.20E+3     2.00E+0     1.20E+3    3.0    3.50E+3
Fluorine         19      <1.00E+0    <2.00E-1    <1.00E+0    2.0   <1.95E+0
Boron            10       1.00E+2     1.50E-1     9.99E+1    0.3    2.92E+1
Beryllium         9       NC         <3.00E-2     NG         0.5    NG        A
Lithium           7       3.00E+1    <1.50E-2     3.00E-1    0.3    8.77E+0


                                                         TOTALS:   9.07E+4
                                                                  <1.75E+1


(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION


RW=1.36E-01  TV=1.00E+02  AV=1.00E+01  F=1.00E+00  NF=1.00E+00
TW=3.14E+00  AW=1.50E-01  M3=2.91E+01
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SSMS ANALYSIS OF SASS SAMPLES
RESIN XR-E062581 (#424) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3
Uranium	238	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<2.33E+0
Thorium	232	<5.00E-1	<6.00E-1	<5.00E-1	2.0	<4.67E+0
Bismuth	209	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<2.33E+0
Lead	208	2.00E+0	<1.00E+0	2.00E+0	1.0	9.33E+0
Thallium	205	<7.00E-1	<2.00E+0	<7.00E-1	2.0	<6.53E+0
Mercury	202	<2.00E+0	<2.00E+0	<2.00E+0	10.	<9.33E+1
Gold	197	<5.00E-1	NC	<5.00E-1	1.0	<2.33E+0
Platinum	195	<1.00E+0	NC	<1.00E+0	1.0	<4.67E+0
Iridium	193	<1.00E+0	NC	<1.00E-0	1.0	<4.67E+0
Osmium	190	<2.00E+0	NC	<2.00E+0	1.0	<9.33E+0
Rhenium	187	<1.00E+0	NC	<1.00E-0	1.0	<4.67E+0
Tungsten	184	<1.00E+0	<2.00E+0	<1.00E-0	1.0	<4.67E+0
Tantalum	181	<3.00E+0	<5.00E+0	<3.00E+0	1.0	<1.40E+1
Hafnium	178	<1.00E+0	NC	<1.00E+0	1.0	<4.67E+0
Lutecium	175	<5.00E-1	NC	<5.00E-1	1.0	<2.33E+0
Ytterbium	174	<1.00E+0	NC	<1.00E+0	1.0	<4.67E+0
Thulium	169	<5.00E-1	NC	<5.00E-1	1.0	<2.33E+0
Erbium	166	<1.00E+0	NC	<1.00E+0	1.0	<4.67E+0
Holmium	165	<5.00E-1	NC	<5.00E-1	1.0	<2.33E+0
Dysprosium	164	<1.00E+0	NC	<1.00E+0	1.0	<4.67E+0
Terbium	159	<3.00E-1	NC	<3.00E-1	1.0	<1.40E+0
Gadolinium	158	<1.00E+0	NC	<1.00E+0	1.0	<4.67E+0
Europium	153	<7.00E-1	NC	<7.00E-1	1.0	<3.27E+0
Samarium	152	<1.00E+0	NC	<1.00E+0	1.0	<4.67E+0
Neodymium	144	<2.00E+0	NC	<2.00E-0	1.0	<9.33E+0
Praseodymium	141	<3.00E-1	NC	<3.00E-1	1.0	<1.40E+0
Cerium	140	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<7.00E-1
Lanthanum	139	<3.00E-1	NC	<3.00E-1	1.0	<1.40E+0
Barium	137	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<2.33E+0
Cesium	133	<3.00E-1	<3.00E-1	<3.00E-1	0.1	<2.10E-1
Iodine	127	<3.00E-1	1.00E+0	<3.00E-1	1.5	<2.10E+0
Tellurium	128	<1.00E+0	<1.00E+0	<1.00E-0	1.0	<4.67E+0
Antimony	121	<7.00E-1	<6.00E-1	<7.00E-1	0.6	<1.96E+0
Tin	118	<1.00E+0	<1.00E+0	<1.00E-0	1.0	<4.67E+0
Indium	115	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<7.00E-1
Cadmium	114	<1.00E+0	<1.00E+0	<1.00E+0	3.0	<1.40E+1
Silver	107	<5.00E-1	<5.00E-1	<5.00E-1	0.3	<7.00E-1
Palladium	105	<1.00E+0	NC	<1.00E+0	1.0	<4.67E+0
Rhodium	103	<3.00E-1	NC	<3.00E-1	1.0	<1.40E+0
Ruthenium	101	<7.00E-1	NC	<7.00E-1	1.0	<3.27E+0
Molybdenum	98	1.00E+0	<1.00E+0	1.00E-0	0.5	NG
Niobium	93	<2.00E-1	<3.00E-1	<2.00E-1	1.0	<9.33E-1
Zirconium	90	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<2.33E+0
Yttrium	89	<2.00E-1	NC	<2.00E-1	1.0	<9.33E-1
Strontium	86	<2.00E-1	<2.00E-1	<2.00E-1	0.2	<1.87E-1
Rubidium	85	<3.00E-1	<3.00E-1	<3.00E-1	0.2	<2.80E-1
Bromine	79	3.00E-1	<5.00E-1	3.00E-1	2.5	3.50E+0
Selenium	80	<5.00E-1	7.00E+0	<5.00E-1	0.7	<1.63E+0
Arsenic	75	<2.00E-1	<2.00E-1	<2.00E-1	0.5	<4.67E-1
Germanium	72	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<2.33E+0
Gallium	71	<3.00E-1	<4.00E-1	<3.00E-1	0.5	<7.00E-1
Zinc	66	5.00E+0	<5.00E-1	5.00E+0	1.0	NG

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SSMS ANALYSIS OF SASS SAMPLES
RESIN XR-E062581 (#424) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3	
Copper	63	2.00E+2	<1.00E+0	2.00E+2	0.5	4.55E+2	
Nickel	58	1.00E+3	<3.00E-1	1.00E+3	0.5	2.17E+3	
Cobalt	59	5.00E+0	<2.00E-1	5.00E+0	0.5	9.35E+0	
Iron	57	7.00E+2	1.00E+0	6.99E+2	0.3	8.83E+2	
Manganese	55	5.00E+1	1.50E-1	4.98E+1	0.3	6.90E+1	
Chromium	53	1.00E+2	<1.50E-1	1.00E+2	0.3	1.26E+2	
Vanadium	51	1.00E-1	<1.50E-1	1.00E-1	0.3	6.96E-4	
Titanium	47	3.00E+1	<4.00E-1	3.00E+1	0.5	5.84E+1	
Scandium	45	<1.00E+0	NC	<1.00E+0	1.0	<4.67E+0	
Calcium	43	2.00E+1	1.00E+0	1.90E+1	0.5	NG	
Potassium	41	1.00E+2	3.00E-1	9.97E+1	0.1	2.35E+1	
Chlorine	35	2.00E+2	3.00E+0	1.97E+2	1.0	8.64E+2	
Sulphur	33	3.00E+2	NC	3.00E+2	1.0	7.04E+2	
Phosphorus	31/2	1.50E+1	<1.00E-1	1.50E+1	0.4	1.87E+1	
Silicon	29/2	5.00E+2	5.00E+1	4.50E+2	0.3	NG	
Aluminum	27/2	5.00E+2	1.00E+1	4.90E+2	0.3	3.41E+0	
Magnesium	25/2	2.00E+2	<6.00E-1	2.00E+2	0.1	4.64E-1	
Sodium	23/2	5.00E+2	2.00E+0	4.98E+2	0.3	2.82E+2	
Fluorine	19	<1.00E+0	<2.00E-1	<1.00E+0	2.0	<9.33E+0	
Boron	10	1.00E+1	1.50E-1	9.85E+0	0.3	9.82E+0	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	5.00E-1	<1.50E-2	5.00E-1	0.3	NG	

TOTALS: 5.69E+3
<2.71E+2

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION

RW=1.01E-01 TV=1.00E+02 AV=1.00E+01 F=1.00E+00 NF=1.00E+00
TW=1.35E+02 AW=1.00E+00 M3=2.91E+01

SSMS ANALYSIS OF SASS SAMPLES
DILUTION FILTER DF-E062581 (#435) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3
Uranium	238	<2.00E-1	<6.00E-1	<2.00E-1	3.0	<2.37E-1
Thorium	232	<2.00E-1	<6.00E-1	<2.00E-1	3.0	<2.37E-1
Bismuth	209	3.00E-1	<6.00E-1	3.00E-1	1.0	1.18E-1
Lead	208	4.50E+3	<1.00E+0	4.50E+3	2.0	3.55E+3
Thallium	205	<1.00E-1	<2.00E+0	<1.00E-1	2.0	<7.90E-2
Mercury	202	<3.00E-1	<2.00E+0	<3.00E-1	10.	<1.18E+0
Gold	197	<1.00E-1	NC	<1.00E-1	1.0	<3.95E-2
Platinum	195	<3.00E-1	NC	<3.00E-1	1.0	<1.18E-1
Iridium	193	<2.00E-1	NC	<2.00E-1	1.0	<7.90E-2
Osmium	190	<3.00E-1	NC	<3.00E-1	1.0	<1.18E-1
Rhenium	187	<2.00E-1	NC	<2.00E-1	1.0	<7.90E-2
Tungsten	184	<3.00E-1	<2.00E+0	<3.00E-1	1.0	<1.18E-1
Tantalum	181	<3.00E-1	<5.00E+0	<3.00E-1	2.0	<2.37E-1
Hafnium	178	<3.00E-1	NC	<3.00E-1	5.0	<5.92E-1
Lutecium	175	<1.00E-1	NC	<1.00E-1	1.0	<3.95E-2
Ytterbium	174	<3.00E-1	NC	<3.00E-1	1.0	<1.18E-1
Thulium	169	<1.00E-1	NC	<1.00E-1	1.0	<3.95E-2
Erbium	166	<2.00E-1	NC	<2.00E-1	1.0	<7.90E-2
Holmium	165	<1.00E-1	NC	<1.00E-1	1.0	<3.95E-2
Dysprosium	164	<3.00E-1	NC	<3.00E-1	1.0	<1.18E-1
Terbium	159	<7.00E-2	NC	<7.00E-2	1.0	<2.76E-2
Gadolinium	158	<3.00E-1	NC	<3.00E-1	1.0	<1.18E-1
Europium	153	<2.00E-1	NC	<2.00E-1	1.0	<7.90E-2
Samarium	152	<3.00E-1	NC	<3.00E-1	1.0	<1.18E-1
Neodymium	144	<5.00E-1	NC	<5.00E-1	1.0	<1.97E-1
Praseodymium	141	<7.00E-2	NC	<7.00E-2	1.0	<2.76E-2
Cerium	140	7.00E-1	<3.00E-1	7.00E-1	1.0	2.76E-1
Lanthanum	139	2.00E-1	NC	2.00E-1	1.0	7.90E-2
Barium	137	2.00E+3	<6.00E-1	2.00E+3	1.0	7.72E+2
Cesium	133	<7.00E-2	<3.00E-1	<7.00E-2	0.5	<1.38E-2
Iodine	127	1.00E-1	1.00E+0	<9.00E-1	1.5	<5.33E-1
Tellurium	128	<2.00E-1	<1.00E+0	<2.00E-1	1.0	<7.90E-2
Antimony	121	5.00E+0	<6.00E-1	5.00E+0	0.6	1.18E+0
Tin	118	1.00E+2	<1.00E+0	1.00E+2	1.0	3.93E+1
Indium	115	2.00E+0	<3.00E-1	2.00E+0	1.0	7.90E-1
Cadmium	114	3.00E+0	<1.00E+0	3.00E+0	3.0	3.55E+0
Silver	107	7.00E-1	<5.00E-1	7.00E-1	1.0	2.76E-1
Palladium	105	<2.00E-1	NC	<2.00E-1	1.0	<7.90E-2
Rhodium	103	<5.00E-1	NC	<5.00E-1	1.0	<1.97E-1
Ruthenium	101	<3.00E-1	NC	<3.00E-1	1.0	<1.18E-1
Molybdenum	98	7.00E+1	<1.00E-0	7.00E+1	1.0	2.76E+1
Niobium	93	5.00E-2	<3.00E-1	5.00E-2	1.0	1.97E-2
Zirconium	90	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<1.18E-1
Yttrium	89	<5.00E-2	NC	<5.00E-2	1.0	<1.97E-2
Strontium	86	3.00E+1	<2.00E-1	3.00E+1	0.5	5.83E+0
Rubidium	85	2.00E+0	<3.00E-1	2.00E+0	0.5	3.41E-1
Bromine	79	1.00E+0	<5.00E-1	1.00E-0	4.0	1.58E+0
Selenium	80	<7.00E-1	7.00E+0	<7.00E-1	2.0	<5.53E-1
Arsenic	75	3.00E+0	<2.00E-1	3.00E+0	1.0	1.18E+0
Germanium	72	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<1.97E-1
Gallium	71	<1.00E-1	<4.00E-1	<1.00E-1	0.6	<2.37E-2
Zinc	66	1.50E+4	<5.00E-1	1.50E+4	2.0	1.18E+4

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SSMS ANALYSIS OF SPSS SAMPLES
DILUTION FILTER DF-E062581 (#435) BLANK CORRECTED

             LINE USED  UNCORRECTED                CORRECTED
                FOR       SAMPLE        BLANK        SAMPLE
 ELEMENT     ESTIMATE     VALUE         VALUE        VALUE     RSC   UGRAMS/M**3

Copper          63       1.00E+3      <1.00E+0     1.00E+3    1.0    3.94E+2
Nickel          58       1.00E+2      <3.00E-1     1.00E+2    1.0    3.93E+1
Cobalt          59       5.00E+0      <2.00E-1     5.00E+0    1.0    1.95E+0
Iron            57       5.00E+3       1.00E+0     5.00E+3    1.0    1.97E+3
Manganese       55       2.00E+2       1.50E-1     2.00E+2    1.0    7.88E+1
Chromium        53       5.00E+1      <1.50E-1     5.00E+1    1.0    1.97E+1
Vanadium        51       1.00E+0      <1.50E-1     1.00E+0    1.0    3.89E-1
Titanium        47       5.00E+1      <4.00E-1     5.00E+1    2.0    3.93E+1
Scandium        45      <3.00E-1       NC         <3.00E-1    0.7   <8.29E-2
Calcium         43       5.00E+4       1.00E+0     5.00E+4    0.3    5.91E+3
Potassium       41       2.00E+3       3.00E-1     2.00E+3    0.3    1.92E+2
Chlorine        35       7.50E+3       3.00E+0     7.50E+3    0.5    1.47E+3
Sulphur         33       1.00E+3       NC          1.00E+3    1.0    3.77E+2
Phosphorus      31/2     1.50E+4      <1.00E-1     1.50E+4    1.0    5.92E+3
Silicon         29/2     5.00E+2       5.00E+1     4.50E+2    0.7    NG
Aluminum        27/2     1.00E+3       1.00E+1     9.90E+2    1.0    2.02E+2
Magnesium       25/2     8.50E+4      <6.00E-1     8.50E+4    0.5    1.68E+4
Sodium          23/2     2.50E+4       2.00E+0     2.50E+4    3.0    2.91E+4
Fluorine        19      <1.00E+0      <2.00E-1    <1.00E+0    2.0   <7.90E-1
Boron           10       2.00E+2       1.50E-1     2.00E+2    0.3    2.34E+1
Beryllium        9       NC           <3.00E-2     NG         0.5    NG        A
Lithium          7       2.50E+2      <1.50E-2     2.50E+2    0.3    2.96E+1

                                                       TOTALS:  7.88E+4
                                                               <5.93E+0

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION

RW=1.78E-01  TV=2.50E+02  AV=1.00E+01  F=1.25E-01  NF=1.00E+00
TW=1.00E+00  AW=1.00E+00  M3=9.01E+01
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SSMS ANALYSIS OF SASS SAMPLES
IMPINGER + CONDENSATE HI/CD/O-E061881 (#411/#412) BLK CORR

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3
Uranium	238	<5.00E-2	<6.00E-1	<5.00E-2	3.0	<5.94E-1
Thorium	232	<5.00E-2	<6.00E-1	<5.00E-2	3.0	<5.94E-1
Bismuth	209	<5.00E-2	<6.00E-1	<5.00E-2	1.0	<1.98E-1
Lead	208	1.00E-1	<1.00E+0	1.00E-1	2.0	7.92E-1
Thallium	205	<5.00E-2	<2.00E+0	<5.00E-2	2.0	<3.96E-1
Mercury	202	<1.00E-1	<2.00E+0	<1.00E-1	10.	<3.96E+0
Gold	197	<5.00E-2	NC	<5.00E-2	1.0	<1.98E-1
Platinum	195	<1.00E-1	NC	<1.00E-1	1.0	<3.96E-1
Iridium	193	<1.00E-1	NC	<1.00E-1	1.0	<3.96E-1
Osmium	190	<1.00E-1	NC	<1.00E-1	1.0	<3.96E-1
Rhenium	187	<7.00E-2	NC	<7.00E-2	1.0	<2.77E-1
Tungsten	184	<1.00E-1	<2.00E+0	<1.00E-1	1.0	<3.96E-1
Tantalum	181	<7.00E-2	<5.00E+0	<7.00E-2	2.0	<5.55E-1
Hafnium	178	<1.00E-1	NC	<1.00E-1	5.0	<1.98E+0
Lutecium	175	<3.00E-2	NC	<3.00E-2	1.0	<1.19E-1
Ytterbium	174	<1.00E-1	NC	<1.00E-1	1.0	<3.96E-1
Thulium	169	<3.00E-2	NC	<3.00E-2	1.0	<1.19E-1
Erbium	166	<1.00E-1	NC	<1.00E-1	1.0	<3.96E-1
Holmium	165	<3.00E-2	NC	<3.00E-2	1.0	<1.19E-1
Dysprosium	164	<1.00E-1	NC	<1.00E-1	1.0	<3.96E-1
Terbium	159	<3.00E-2	NC	<3.00E-2	1.0	<1.19E-1
Gadolinium	158	<1.00E-1	NC	<1.00E-1	1.0	<3.96E-1
Europium	153	<7.00E-2	NC	<7.00E-2	1.0	<2.77E-1
Samarium	152	<1.00E-1	NC	<1.00E-1	1.0	<3.96E-1
Neodymium	144	<2.00E-1	NC	<2.00E-1	1.0	<7.92E-1
Praseodymium	141	<3.00E-2	NC	<3.00E-2	1.0	<1.19E-1
Cerium	140	<3.00E-2	<3.00E-1	<3.00E-2	1.0	<1.19E-1
Lanthanum	139	<3.00E-2	NC	<3.00E-2	1.0	<1.19E-1
Barium	137	<1.00E-1	<6.00E-1	<1.00E-1	1.0	<3.96E-1
Cesium	133	<3.00E-2	<3.00E-1	<3.00E-2	0.5	<5.94E-2
Iodine	127	<3.00E-2	1.00E+0	<3.00E-2	1.5	<1.78E-1
Tellurium	128	<1.00E-1	<1.00E+0	<1.00E-1	1.0	<3.95E-1
Antimony	121	<5.00E-2	<6.00E-1	<5.00E-2	0.6	<1.19E-1
Tin	118	<7.00E-2	<1.00E+0	<7.00E-2	1.0	<2.77E-1
Indium	115	<2.00E-2	<3.00E-1	<2.00E-2	1.0	<7.92E-2
Cadmium	114	<1.00E-1	<1.00E+0	<1.00E-1	3.0	<1.19E+0
Silver	107	<5.00E-2	<5.00E-1	<5.00E-2	1.0	<1.98E-1
Palladium	105	<7.00E-2	NC	<7.00E-2	1.0	<2.77E-1
Rhodium	103	<2.00E-2	NC	<2.00E-2	1.0	<7.92E-2
Ruthenium	101	<7.00E-2	NC	<7.00E-2	1.0	<2.77E-1
Molybdenum	98	3.00E+0	<1.00E-0	3.00E+0	1.0	1.12E+1
Niobium	93	2.00E-2	<3.00E-1	2.00E-2	1.0	7.92E-2
Zirconium	90	<3.00E-2	<6.00E-1	<3.00E-2	3.0	<3.57E-1
Yttrium	89	<2.00E-2	NC	<2.00E-2	1.0	<7.92E-2
Strontium	86	2.00E-2	<2.00E-1	2.00E-2	0.5	1.36E-2
Rubidium	85	<5.00E-2	<3.00E-1	<5.00E-2	0.5	<9.90E-2
Bromine	79	1.00E-1	<5.00E-1	1.00E-1	4.0	NG
Selenium	80	<2.00E-1	7.00E+0	<2.00E-1	2.0	<1.58E+0
Arsenic	75	3.00E-2	<2.00E-1	3.00E-2	1.0	5.39E-2
Germanium	72	<5.00E-2	<6.00E-1	<5.00E-2	1.0	<1.98E-1
Gallium	71	<7.00E-2	<4.00E-1	<7.00E-2	0.6	<1.66E-1
Zinc	66	5.00E-1	<5.00E-1	5.00E-1	2.0	7.12E-1

SSMS ANALYSIS OF SASS SAMPLES
IMPINGER + CONDENSATE HI/CD/O-E061881 (#411/#412) BLK CORR

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3	
Copper	63	7.00E-1	<1.00E+0	7.00E-1	1.0	2.12E+0	
Nickel	58	7.00E+1	<3.00E-1	7.00E+1	1.0	2.77E+2	
Cobalt	59	1.00E+0	<2.00E-1	1.00E+0	1.0	3.64E+0	
Iron	57	2.00E+2	1.00E+0	1.99E+2	1.0	7.87E+2	
Manganese	55	7.00E+0	1.50E-1	6.85E+0	1.0	2.71E+1	
Chromium	53	3.00E+1	<1.50E-1	3.00E+1	1.0	1.19E+2	
Vanadium	51	3.00E-1	<1.50E-1	3.00E-1	1.0	1.17E+0	
Titanium	47	<1.00E-1	<4.00E-1	<1.00E-1	2.0	<7.92E-1	
Scandium	45	<2.00E-1	NC	<2.00E-1	0.7	<5.55E-1	
Calcium	43	1.00E+1	1.00E+0	9.00E+0	0.3	4.52E+0	
Potassium	41	1.00E+1	3.00E-1	9.70E+0	0.3	5.05E+0	
Chlorine	35	3.00E-1	3.00E+0	<2.70E+0	0.5	<5.35E+0	
Sulphur	33	7.00E+3	NC	7.00E+3	1.0	2.77E+4	
Phosphorus	31/2	7.00E+0	<1.00E-1	7.00E+0	1.0	2.70E+1	
Silicon	29/2	1.50E+2	5.00E-1	1.00E-2	0.7	2.77E+2	
Aluminum	27/2	5.00E+1	1.00E+1	4.00E+1	1.0	1.51E+2	
Magnesium	25/2	5.00E+1	<6.00E-1	5.00E+1	0.5	9.91E+1	
Sodium	23/2	1.50E+5	2.00E+0	1.50E+5	3.0	1.78E+6	
Fluorine	19	<1.00E-1	<2.00E-1	<1.00E-1	2.0	<7.92E-1	
Boron	10	7.00E-1	1.50E-1	5.50E-1	0.3	6.44E-1	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	1.00E-2	<1.50E-2	1.00E-2	0.3	1.19E-2	

TOTALS: 1.81E+6
<2.77E+1

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION.

RW=3.11E-01 TV=1.96E+03 AV=1.00E+01 F=1.00E+00 NF=1.00E+00
TW=1.00E+00 AW=1.00E+00 M3=1.54E+01

SSMS ANALYSIS OF SASS SAMPLES
FILTER PFA-E061881 (#420) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3
Uranium	238	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<2.15E-1
Thorium	232	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<2.15E-1
Bismuth	209	3.00E-1	<6.00E-1	3.00E-1	1.0	2.15E-1
Lead	208	2.00E+4	<1.00E+0	2.00E+4	2.0	2.86E+4
Thallium	205	<1.00E-1	<2.00E+0	<1.00E-1	2.0	<1.43E-1
Mercury	202	<3.00E-1	<2.00E+0	<3.00E-1	10.	<2.15E+0
Gold	197	<1.00E-1	NC	<1.00E-1	1.0	<7.16E-2
Platinum	195	<3.00E-1	NC	<3.00E-1	1.0	<2.15E-1
Iridium	193	<2.00E-1	NC	<2.00E-1	1.0	<1.43E-1
Osmium	190	<3.00E-1	NC	<3.00E-1	1.0	<2.15E-1
Rhenium	187	<2.00E-1	NC	<2.00E-1	1.0	<1.43E-1
Tungsten	184	<3.00E-1	<2.00E+0	<3.00E-1	1.0	<2.15E-1
Tantalum	181	<2.00E+0	<5.00E+0	<2.00E+0	2.0	<2.86E+0
Hafnium	178	<3.00E-1	NC	<3.00E-1	5.0	<1.07E+0
Lutecium	175	<1.00E-1	NC	<1.00E-1	1.0	<7.16E-2
Ytterbium	174	<3.00E-1	NC	<3.00E-1	1.0	<2.15E-1
Thulium	169	<1.00E-1	NC	<1.00E-1	1.0	<7.16E-2
Erbium	166	<2.00E-1	NC	<2.00E-1	1.0	<1.43E-1
Holmium	165	<1.00E-1	NC	<1.00E-1	1.0	<7.16E-2
Dysprosium	164	<3.00E-1	NC	<3.00E-1	1.0	<2.15E-1
Terbium	159	<7.00E-2	NC	<7.00E-2	1.0	<5.01E-2
Gadolinium	158	<3.00E-1	NC	<3.00E-1	1.0	<2.15E-1
Europium	153	<2.00E-1	NC	<2.00E-1	1.0	<1.43E-1
Samarium	152	<3.00E-1	NC	<3.00E-1	1.0	<2.15E-1
Neodymium	144	<5.00E-1	NC	<5.00E-1	1.0	<3.58E-1
Praseodymium	141	<7.00E-2	NC	<7.00E-2	1.0	<5.01E-2
Cerium	140	7.00E-1	<3.00E-1	7.00E-1	1.0	5.01E-1
Lanthanum	139	7.00E-2	NC	7.00E-2	1.0	5.01E-2
Barium	137	5.00E+1	<6.00E-1	5.00E+1	1.0	NG
Cesium	133	<7.00E-2	<3.00E-1	<7.00E-2	0.5	<2.51E-2
Iodine	127	2.00E-1	1.00E+0	<8.00E-1	1.5	<8.59E-1
Tellurium	128	<2.00E-1	<1.00E+0	<2.00E-1	1.0	<1.43E-1
Antimony	121	7.00E+0	<6.00E-1	7.00E+0	0.6	3.01E+0
Tin	118	2.00E+1	<1.00E+0	2.00E+1	1.0	1.28E+1
Indium	115	1.00E-1	<3.00E-1	1.00E-1	1.0	7.16E-2
Cadmium	114	<7.00E-1	<1.00E+0	<7.00E-1	3.0	<1.50E+0
Silver	107	3.00E-1	<5.00E-1	3.00E-1	1.0	2.15E-1
Palladium	105	<2.00E-1	NC	<2.00E-1	1.0	<1.43E-1
Rhodium	103	<5.00E-1	NC	<5.00E-1	1.0	<3.58E-1
Ruthenium	101	<3.00E-1	NC	<3.00E-1	1.0	<2.15E-1
Molybdenum	98	3.00E+1	<1.00E+0	3.00E+1	1.0	2.15E+1
Niobium	93	<5.00E-2	<3.00E-1	<5.00E-2	1.0	<3.58E-2
Zirconium	90	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<2.15E-1
Yttrium	89	<5.00E-2	NC	<5.00E-2	1.0	<3.58E-2
Strontium	86	3.00E+0	<2.00E-1	3.00E+0	0.5	1.00E+0
Rubidium	85	1.00E-1	<3.00E-1	1.00E-1	0.5	3.58E-2
Bromine	79	2.00E-1	<5.00E-1	2.00E-1	4.0	NG
Selenium	80	<5.00E-1	7.00E+0	<5.00E-1	2.0	<7.16E-1
Arsenic	75	2.00E+0	<2.00E-1	2.00E+0	1.0	1.43E+0
Germanium	72	<2.00E-1	<6.00E-1	<2.00E-1	1.0	<1.43E-1
Gallium	71	<1.00E-1	<4.00E-1	<1.00E-1	0.6	<4.30E-2
Zinc	66	7.00E+3	<5.00E-1	7.00E+3	2.0	1.00E+4

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SSMS ANALYSIS OF SASS SAMPLES
FILTER PFA-E061881 (#420) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3	
Copper	63	7.00E+2	<1.00E+0	7.00E+2	1.0	5.00E+2	
Nickel	58	3.00E+1	<3.00E-1	3.00E+1	1.0	1.97E+1	
Cobalt	59	1.00E+0	<2.00E-1	1.00E+0	1.0	4.56E-1	
Iron	57	5.00E+3	1.00E+0	5.00E+3	1.0	3.57E+3	
Manganese	55	5.00E+2	1.50E-1	5.00E+2	1.0	3.58E+2	
Chromium	53	1.00E+2	<1.50E-1	1.00E+2	1.0	7.08E+1	
Vanadium	51	3.00E-1	<1.50E-1	3.00E-1	1.0	1.99E-1	
Titanium	47	2.00E+1	<4.00E-1	2.00E+1	2.0	2.73E+1	
Scandium	45	<3.00E-1	NC	<3.00E-1	0.7	<1.50E-1	
Calcium	43	3.00E+3	1.00E+0	3.00E+3	0.3	5.92E+2	
Potassium	41	5.00E+2	3.00E-1	5.00E+2	0.3	9.43E+1	
Chlorine	35	5.00E+2	3.00E+0	4.97E+2	0.5	1.53E+2	
Sulphur	33	7.00E+1	NC	7.00E+1	1.0	NG	
Phosphorus	31/2	7.00E+3	<1.00E-1	7.00E+3	1.0	5.01E+3	
Silicon	29/2	5.00E+2	5.00E+1	4.50E+2	0.7	7.73E+1	
Aluminum	27/2	5.00E+2	1.00E+1	4.90E+2	1.0	3.21E+2	
Magnesium	25/2	2.00E+4	<6.00E-1	2.00E+4	0.5	7.15E+3	
Sodium	23/2	5.50E+3	2.00E+0	5.50E+3	3.0	1.17E+4	
Fluorine	19	<1.00E+0	<2.00E-1	<1.00E+0	2.0	<1.43E+0	
Boron	10	2.00E+2	1.50E-1	2.00E-2	0.3	4.14E+1	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	5.00E+1	<1.50E-2	5.00E+1	0.3	1.03E+1	
					TOTALS:	6.83E+4	
						<1.55E+1	

(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION

RW=1.38E-01 TV=1.00E+02 AV=1.00E+01 F=1.25E-01 NF=1.00E+00
TW=1.00E+00 AW=1.00E+00 M3=1.54E+01

SSMS ANALYSIS OF SASS SAMPLES
RESIN XR-E051881 (#.09) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3
Uranium	238	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<4.54E+0
Thorium	232	<5.00E-1	<6.00E-1	<5.00E-1	2.0	<9.08E+0
Bismuth	209	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<4.54E+0
Lead	208	1.00E+0	<1.00E+0	1.00E+0	1.0	9.08E+0
Thallium	205	<7.00E-1	<2.00E+0	<7.00E-1	2.0	<1.27E+1
Mercury	202	<2.00E+0	<2.00E+0	<2.00E+0	10.	<1.82E+2
Gold	197	<5.00E-1	NC	<5.00E-1	1.0	<4.54E+0
Platinum	195	<1.00E+0	NC	<1.00E+0	1.0	<9.08E+0
Iridium	193	<1.00E+0	NC	<1.00E+0	1.0	<9.08E+0
Osmium	190	<2.00E+0	NC	<2.00E+0	1.0	<1.82E+1
Rhenium	187	<1.00E+0	NC	<1.00E+0	1.0	<9.08E+0
Tungsten	184	<1.00E+0	<2.00E+0	<1.00E+0	1.0	<9.08E+0
Tantalum	181	<5.00E+0	<5.00E+0	<5.00E+0	1.0	<4.54E+1
Hafnium	178	<1.00E+0	NC	<1.00E+0	1.0	<9.08E+0
Lutecium	175	<5.00E-1	NC	<5.00E-1	1.0	<4.54E+0
Ytterbium	174	<1.00E+0	NC	<1.00E+0	1.0	<9.08E+0
Thulium	169	<5.00E-1	NC	<5.00E-1	1.0	<4.54E+0
Erbium	166	<1.00E+0	NC	<1.00E+0	1.0	<9.08E+0
Holmium	165	<5.00E-1	NC	<5.00E-1	1.0	<4.54E+0
Dysprosium	164	<1.00E+0	NC	<1.00E+0	1.0	<9.08E+0
Terbium	159	<3.00E-1	NC	<3.00E-1	1.0	<2.72E+0
Gadolinium	158	<1.00E+0	NC	<1.00E+0	1.0	<9.08E+0
Europium	153	<7.00E-1	NC	<7.00E-1	1.0	<6.36E+0
Samarium	152	<1.00E+0	NC	<1.00E+0	1.0	<9.08E+0
Neodymium	144	<2.00E+0	NC	<2.00E+0	1.0	<1.82E+1
Praseodymium	141	<3.00E-1	NC	<3.00E-1	1.0	<2.72E+0
Cerium	140	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<1.36E+0
Lanthanum	139	<3.00E-1	NC	<3.00E-1	1.0	<2.72E+0
Barium	137	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<4.54E+0
Cesium	133	<3.00E-1	<3.00E-1	<3.00E-1	0.1	<4.09E-1
Iodine	127	<3.00E-1	1.00E+0	<3.00E-1	1.5	<4.09E+0
Tellurium	128	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<9.08E+0
Antimony	121	<7.00E-1	<6.00E-1	<7.00E-1	0.6	<3.81E+0
Tin	118	<1.00E+0	<1.00E+0	<1.00E+0	1.0	<9.08E+0
Indium	115	<3.00E-1	<3.00E-1	<3.00E-1	0.5	<1.36E+0
Cadmium	114	<1.00E+0	<1.00E+0	<1.00E+0	3.0	<2.72E+1
Silver	107	3.00E+0	<5.00E-1	3.00E+0	0.3	8.17E+0
Palladium	105	<1.00E+0	NC	<1.00E+0	1.0	<9.08E+0
Rhodium	103	<3.00E-1	NC	<3.00E-1	1.0	<2.72E+0
Ruthenium	101	<7.00E-1	NC	<7.00E-1	1.0	<6.36E+0
Molybdenum	98	7.00E+0	<1.00E+0	7.00E+0	0.5	1.86E+1
Niobium	93	<2.00E-1	<3.00E-1	<2.00E-1	1.0	<1.82E+0
Zirconium	90	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<4.54E+0
Yttrium	89	<2.00E-1	NC	<2.00E-1	1.0	<1.82E+0
Strontium	86	<2.00E-1	<2.00E-1	<2.00E-1	0.2	<3.63E-1
Rubidium	85	<3.00E-1	<3.00E-1	<3.00E-1	0.2	<5.45E-1
Bromine	79	3.00E+0	<5.00E-1	3.00E+0	2.5	6.81E+1
Selenium	80	<5.00E-1	7.00E+0	<5.00E-1	0.7	<3.18E+0
Arsenic	75	3.00E-1	<2.00E-1	3.00E-1	0.5	1.36E+0
Germanium	72	<5.00E-1	<6.00E-1	<5.00E-1	1.0	<4.54E+0
Gallium	71	<5.00E-1	<4.00E-1	<5.00E-1	0.5	<2.27E+0
Zinc	66	1.00E+1	<5.00E-1	1.00E+1	1.0	3.07E+0

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SSMS ANALYSIS OF SASS SAMPLES
RESIN XR-E061881 (#409) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3	
Copper	63	5.00E+2	<1.00E+0	5.00E+2	0.5	2.25E+3	
Nickel	58	2.00E+3	<3.00E-1	2.00E+3	0.5	8.77E+3	
Cobalt	59	5.00E+0	<2.00E-1	5.00E+0	0.5	1.83E+1	
Iron	57	1.00E+3	1.00E+0	9.99E+2	0.3	2.54E+3	
Manganese	55	1.50E+2	1.50E-1	1.50E+2	0.3	4.07E+2	
Chromium	53	2.00E+2	<1.50E-1	2.00E+2	0.3	5.19E+2	
Vanadium	51	5.00E-1	<1.50E-1	5.00E-1	0.3	1.10E+0	
Titanium	47	5.00E+0	<4.00E-1	5.00E+0	0.5	7.67E-1	
Scandium	45	<1.00E+0	NC	<1.00E+0	1.0	<9.08E+0	
Calcium	43	7.00E+1	1.00E+0	6.90E+1	0.5	NG	
Potassium	41	2.50E+2	3.00E-1	2.50E+2	0.1	1.83E+2	
Chlorine	35	1.00E+1	3.00E+0	7.00E+0	1.0	NG	
Sulphur	33	2.00E+3	NC	2.00E+3	1.0	1.68E+4	
Phosphorus	31/2	5.00E+0	<1.00E-1	5.00E+0	0.4	6.14E-1	
Silicon	29/2	1.50E+2	5.00E+1	1.00E+2	0.3	NG	
Aluminum	27/2	2.00E+2	1.00E+1	1.90E+2	0.3	NG	
Magnesium	25/2	2.00E+2	<6.00E-1	2.00E+2	0.1	6.14E+0	
Sodium	23/2	3.00E+3	2.00E+0	3.00E+3	0.3	7.38E+3	
Fluorine	19	<1.00E+0	<2.00E-1	<1.00E+0	2.0	<1.82E+1	
Boron	10	2.00E+0	1.50E-1	1.85E+0	0.3	NG	
Beryllium	9	NC	<3.00E-2	NG	0.5	NG	A
Lithium	7	3.00E-1	<1.50E-2	3.00E-1	0.3	NG	

TOTALS: 3.90E+4
<5.43E+2

(A) NOT DETERMINED DUE TO INSTRUMENT MALFUNCTION

RW=1.04E-01 TV=1.00E+02 AV=1.00E+01 F=1.00E+00 NF=1.00E+00
TW=1.35E+02 AW=1.00E+00 M3=1.54E+01

SSMS ANALYSIS OF SASS SAMPLES
DILUTION FILTER DF-E061881 (#419) BLANK CORRECTED

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/M**3
Uranium	238	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<8.70E-2
Thorium	232	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<8.70E-2
Bismuth	209	<1.00E-1	<6.00E-1	<1.00E-1	1.0	<2.90E-2
Lead	208	1.50E+4	<1.00E+0	1.50E+4	2.0	8.70E+3
Thallium	205	<1.00E-1	<2.00E+0	<1.00E-1	2.0	<5.80E-2
Mercury	202	<3.00E-1	<2.00E+0	<3.00E-1	10.	<8.70E-1
Gold	197	<1.00E-1	NC	<1.00E-1	1.0	<2.90E-2
Platinum	195	<3.00E-1	NC	<3.00E-1	1.0	<8.70E-2
Iridium	193	<2.00E-1	NC	<2.00E-1	1.0	<5.80E-2
Osmium	190	<3.00E-1	NC	<3.00E-1	1.0	<8.70E-2
Rhenium	187	<2.00E-1	NC	<2.00E-1	1.0	<5.80E-2
Tungsten	184	<3.00E-1	<2.00E+0	<3.00E-1	1.0	<8.70E-2
Tantalum	181	<2.00E-1	<5.00E+0	<2.00E-1	2.0	<1.16E-1
Hafnium	178	<3.00E-1	NC	<3.00E-1	5.0	<4.35E-1
Lutecium	175	<1.00E-1	NC	<1.00E-1	1.0	<2.90E-2
Ytterbium	174	<3.00E-1	NC	<3.00E-1	1.0	<8.70E-2
Thulium	169	<1.00E-1	NC	<1.00E-1	1.0	<2.90E-2
Erbium	166	<2.00E-1	NC	<2.00E-1	1.0	<5.80E-2
Holmium	165	<1.00E-1	NC	<1.00E-1	1.0	<2.90E-2
Dysprosium	164	<3.00E-1	NC	<3.00E-1	1.0	<8.70E-2
Terbium	159	<7.00E-2	NC	<7.00E-2	1.0	<2.03E-2
Gadolinium	158	<3.00E-1	NC	<3.00E-1	1.0	<8.70E-2
Europium	153	<2.00E-1	NC	<2.00E-1	1.0	<5.80E-2
Samarium	152	<3.00E-1	NC	<3.00E-1	1.0	<8.70E-2
Neodymium	144	<5.00E-1	NC	<5.00E-1	1.0	<1.45E-1
Praseodymium	141	<7.00E-2	NC	<7.00E-2	1.0	<2.03E-2
Cerium	140	2.00E-1	<3.00E-1	2.00E-1	1.0	5.80E-2
Lanthanum	139	7.00E-2	NC	7.00E-2	1.0	2.03E-2
Barium	137	2.00E+2	<6.00E-1	2.00E+2	1.0	4.47E+1
Cesium	133	<7.00E-2	<3.00E-1	<7.00E-2	0.5	<1.02E-2
Iodine	127	5.00E-2	1.00E+0	<9.50E-1	1.5	<4.13E-1
Tellurium	128	<2.00E-1	<1.00E+0	<2.00E-1	1.0	<5.80E-2
Antimony	121	2.00E+1	<6.00E-1	2.00E+1	0.6	3.48E+0
Tin	118	7.00E+1	<1.00E+0	7.00E+1	1.0	2.02E+1
Indium	115	5.00E-2	<3.00E-1	5.00E-2	1.0	1.45E-2
Cadmium	114	<1.00E+0	<1.00E+0	<1.00E+0	3.0	<8.70E-1
Silver	107	1.00E-1	<5.00E-1	1.00E-1	1.0	2.90E-2
Palladium	105	<2.00E-1	NC	<2.00E-1	1.0	<5.80E-2
Rhodium	103	<5.00E-1	NC	<5.00E-1	1.0	<1.45E-1
Ruthenium	101	<3.00E-1	NC	<3.00E-1	1.0	<8.70E-2
Molybdenum	98	1.00E+2	<1.00E+0	1.00E+2	1.0	2.90E+1
Niobium	93	<5.00E-2	<3.00E-1	<5.00E-2	1.0	<1.45E-2
Zirconium	90	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<8.70E-2
Yttrium	89	<5.00E-2	NC	<5.00E-2	1.0	<1.45E-2
Strontium	86	2.00E+1	<2.00E-1	2.00E+1	0.5	2.83E+0
Rubidium	85	3.00E-1	<3.00E-1	3.00E-1	0.5	3.43E-3
Bromine	79	5.00E+0	<5.00E-1	5.00E+0	4.0	5.80E+0
Selenium	80	<3.00E-1	7.00E+0	<3.00E-1	2.0	<1.74E-1
Arsenic	75	5.00E+0	<2.00E-1	5.00E+0	1.0	1.45E+0
Germanium	72	<2.00E-1	<6.00E-1	<2.00E-1	1.0	<5.80E-2
Gallium	71	<1.00E-1	<4.00E-1	<1.00E-1	0.6	<1.74E-2
Zinc	66	1.00E+4	<5.00E-1	1.00E+4	2.0	5.80E+3

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SSMS ANALYSIS OF SASS SAMPLES
DILUTION FILTER DF-E061881 (#419) BLANK CORRECTED

              LINE USED  UNCORRECTED              CORRECTED
                 FOR       SAMPLE      BLANK       SAMPLE
  ELEMENT     ESTIMATE     VALUE       VALUE        VALUE     RSC  UGRAMS/M**3

Copper           63       7.00E+2    <1.00E+0    7.00E+2   1.0    2.02E+2
Nickel           58       5.00E+1    <3.00E-1    5.00E+1   1.0    1.43E+1
Cobalt           59       3.00E+1    <2.00E-1    3.00E+1   1.0    8.69E+0
Iron             57       2.50E+3     1.00E+0    2.50E+3   1.0    7.24E+2
Manganese        55       2.00E+2     1.50E-1    2.00E+2   1.0    5.79E+1
Chromium         53       2.00E+2    <1.50E-1    2.00E+2   1.0    5.80E+1
Vanadium         51       5.00E-1    <1.50E-1    5.00E-1   1.0    1.41E-1
Titanium         47       3.00E+1    <4.00E-1    3.00E+1   2.0    1.73E+1
Scandium         45      <3.00E-1     NC        <3.00E-1   0.7   <6.09E-2
Calcium          43       1.20E+4     1.00E+0    1.20E+4   0.3    1.03E+3
Potassium        41       1.50E+3     3.00E-1    1.50E+3   0.3    9.71E+1
Chlorine         35       7.00E+3     3.00E+0    7.00E+3   0.5    1.01E+3
Sulphur          33       7.00E+2     NC         7.00E+2   1.0    1.90E+2
Phosphorus       31/2     1.00E+4    <1.00E-1    1.00E+4   1.0    2.90E+3
Silicon          29/2     1.00E+3     5.00E+1    9.50E+2   0.7    9.37E+1
Aluminum         27/2     1.00E+3     1.00E+1    9.90E+2   1.0    1.47E+2
Magnesium        25/2     5.00E+4    <6.00E-1    5.00E+4   0.5    7.25E+3
Sodium           23/2     5.50E+3     2.00E+0    5.50E+3   3.0    4.38E+3
Fluorine         19      <1.50E+1    <2.00E-1   <1.50E+1   2.0   <8.70E+0
Boron            10       2.00E+2     1.50E-1    2.00E+2   0.3    1.72E+1
Beryllium         9       NC         <3.00E-2    NG        0.5    NG        A
Lithium           7       7.00E+1    <1.50E-2    7.00E+1   0.3    6.09E+0

                                                     TOTALS:  3.28E+4
                                                             <1.36E+1


(A) NOT DETECTED DUE TO INSTRUMENT MALFUNCTION


RW=1.76E-01  TV=2.50E+02  AV=1.00E+01  F=1.25E-01  NF=1.00E+00
TW=1.00E+00  AW=1.00E+00  M3=1.22E+02
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SSMS ANALYSIS OF SASS SAMPLES
SAMPLE #440 10/30/100

ELEMENT	LINE USED FOR ESTIMATE	UNCORRECTED SAMPLE VALUE	BLANK VALUE	CORRECTED SAMPLE VALUE	RSC	UGRAMS/GRAM
Uranium	238	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<5.00E-1
Thorium	232	<1.00E-1	<6.00E-1	<1.00E-1	3.0	<5.00E-1
Bismuth	209	3.00E+0	<6.00E-1	3.00E+0	1.0	5.00E+0
Lead	208	2.30E+5	<1.00E+0	2.30E+5	2.0	7.67E+5
Thallium	205	<1.00E-1	<2.00E+0	<1.00E-1	2.0	<3.33E-1
Mercury	202	<3.00E-1	<2.00E+0	<3.00E-1	10	<5.00E+0
Gold	197	<1.00E-1	NC	<1.00E-1	1.0	<1.67E-1
Platinum	195	<3.00E-1	NC	<3.00E-1	1.0	<5.00E-1
Iridium	193	<2.00E-1	NC	<2.00E-1	1.0	<3.33E-1
Osmium	190	<2.00E-1	NC	<2.00E-1	1.0	<3.33E-1
Rhenium	187	<2.00E-1	NC	<2.00E-1	1.0	<3.33E-1
Tungsten	184	5.00E+0	<2.00E+0	5.00E+0	1.0	8.33E+0
Tantalum	181	<1.00E+0	<5.00E+0	<1.00E+0	2.0	<3.33E+0
Hafnium	178	<3.00E-1	NC	<3.00E-1	5.0	<2.50E+0
Lutetium	175	<1.00E-1	NC	<1.00E-1	1.0	<1.67E-1
Ytterbium	174	<3.00E-1	NC	<3.00E-1	1.0	<5.00E-1
Thulium	169	<1.00E-1	NC	<1.00E-1	1.0	<1.67E-1
Erbium	166	<2.00E-1	NC	<2.00E-1	1.0	<3.33E-1
Holmium	165	<1.00E-1	NC	<1.00E-1	1.0	<1.67E-1
Dysprosium	164	<5.00E-1	NC	<5.00E-1	1.0	<8.33E-1
Terbium	159	<7.00E-2	NC	<7.00E-2	1.0	<1.17E-1
Gadolinium	158	<3.00E-1	NC	<3.00E-1	1.0	<5.00E-1
Europium	153	<2.00E-1	NC	<2.00E-1	1.0	<3.33E-1
Samarium	152	<3.00E-1	NC	<3.00E-1	1.0	<5.00E-1
Neodymium	144	<5.00E-1	NC	<5.00E-1	1.0	<8.33E-1
Praseodymium	141	2.00E-1	NC	2.00E-1	1.0	3.33E-1
Cerium	140	2.00E+0	<3.00E-1	2.00E+0	1.0	3.33E+0
Lanthanum	139	1.00E+0	NC	1.00E+0	1.0	1.67E+0
Barium	137	5.00E+4	<6.00E-1	5.00E+4	0.7	5.83E+4
Cesium	133	<7.00E-2	<3.00E-1	<7.00E-2	0.5	<5.83E-2
Iodine	127	2.00E-1	1.00E+0	<8.00E-1	1.5	<2.00E+0
Tellurium	128	<7.00E-1	<1.00E+0	<7.00E-1	1.0	<1.17E+0
Antimony	121	1.00E+2	<6.00E-1	1.00E+2	0.6	1.00E+2
Tin	118	5.00E+2	<1.00E+0	5.00E+2	1.0	8.33E+2
Indium	115	<5.00E-1	<3.00E-1	<5.00E-1	1.0	<8.33E-1
Cadmium	114	<5.00E-1	<1.00E+0	<5.00E-1	3.0	<2.50E+0
Silver	107	3.00E+1	<5.00E-1	3.00E+1	1.0	5.00E+1
Palladium	105	<5.00E-1	NC	<5.00E-1	1.0	<8.33E-1
Rhodium	103	<5.00E-1	NC	<5.00E-1	1.0	<8.33E-1
Ruthenium	101	<3.00E-1	NC	<3.00E-1	1.0	<5.00E-1
Molybdenum	98	3.50E+3	<1.00E+0	3.50E+3	1.0	5.83E+3
Niobium	93	2.00E+1	<3.00E-1	2.00E+1	1.0	3.33E+1
Zirconium	90	7.00E+0	<6.00E-1	7.00E+0	3.0	3.50E+1
Yttrium	89	1.00E+0	NC	1.00E+0	1.0	1.67E+0
Strontium	86	1.50E+3	<2.00E-1	1.50E+3	0.5	1.25E+3
Rubidium	85	1.00E+0	<3.00E-1	1.00E+0	0.5	8.33E-1
Bromine	79	3.00E+3	<5.00E-1	3.00E+3	4.0	2.00E+4
Selenium	80	<5.00E-1	7.00E+0	<5.00E-1	2.0	<1.67E+2 A
Arsenic	75	5.00E+0	<2.00E-1	5.00E+0	1.0	8.33E+0
Germanium	72	<1.00E+0	<6.00E-1	<1.00E+0	1.0	<1.67E+0
Gallium	71	5.00E+0	<4.00E-1	5.00E+0	0.6	5.00E+0
Zinc	66	1.50E+4	<5.00E-1	1.50E+4	2.0	5.00E+4

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SSMS ANALYSIS OF SASS SAMPLES
SAMPLE #440 10/30/100

               LINE USED  UNCORRECTED              CORRECTED
                  FOR       SAMPLE       BLANK      SAMPLE
   ELEMENT     ESTIMATE      VALUE       VALUE       VALUE    RSC   UGRAMS/GRAM

Copper            63       7.00E+3    <1.00E+0    7.00E+3   1.0     1.17E+4
Nickel            58       1.00E+2    <3.00E-1    1.00E+2   1.0     1.67E+2
Cobalt            59       3.00E+0    <2.00E-1    3.00E+0   1.0     5.00E+0
Iron              57       1.30E+5     1.00E+0    1.30E+5   1.0     2.17E+5
Manganese         55       1.00E+3     1.50E-1    1.00E+3   1.0     1.67E+3
Chromium          53       3.00E+3    <1.50E-1    3.00E+3   1.0     5.00E+3
Vanadium          51       2.00E+1    <1.50E-1    2.00E+1   1.0     3.33E+1
Titanium          47       2.00E+2    <4.00E-1    2.00E+2   2.0     3.67E+2
Scandium          45      <3.00E-1     NC        <3.00E-1   0.7    <3.50E-1
Calcium           43       2.50E+5     1.00E+0    2.50E+5   0.3     1.25E+5
Potassium         41       2.00E+3     3.00E-1    2.00E+3   0.3     1.00E+3
Chlorine          35       1.50E+3     3.00E+0    1.50E+3   0.5     1.25E+3
Sulphur           33       1.00E+3     NC         1.00E+3   1.0     1.67E+3
Phosphorus        31/2     2.50E+4    <1.00E-1    2.50E+4   1.0     4.17E+4
Silicon           29/2     3.00E+3     5.00E-1    2.95E+3   0.7     3.44E+3
Aluminum          27/2     1.50E+3     1.00E-1    1.49E+3   1.0     2.48E+3
Magnesium         25/2     5.00E+4    <6.00E-1    5.00E+4   0.5     4.17E+4
Sodium            23/2     1.00E+3     2.00E+0    9.98E+2   3.0     4.99E+3
Fluorine          19      <2.00E+1    <2.00E-1   <2.00E+1   2.0    <6.67E+1
Boron             10       3.00E+2     1.50E-1    3.00E+2   0.3     1.50E+2
Beryllium          9      <5.00E-3    <3.00E-2   <5.00E-3   0.5    <4.17E-3
Lithium            7       7.00E+1    <1.50E-2    7.00E+1   0.3     3.50E+1

                                                          TOTALS    1.36E+6
                                                                   <2.62E+2

(A) MEMORY FROM PREVIOUS SAMPLES

RW=1.00E-01  TV=1.00E+00  AV=1.00E+00  F=1.00E+00  NF=1.00E+00
TW=1.00E+00  AW=6.00E-02  M3=1.00E+00
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